Exploring a social “bouba-kiki” effect and the affective consequences of having a congruent versus incongruent name

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A thesis submitted for the degree of

Doctor of Philosophy

of the University of Otago, Dunedin

New Zealand

June 2016

Abstract

This thesis was inspired from studies on the “bouba-kiki” effect, which shows that a sound-symbolic relationship exists between names and the physical objects they represent. Research on the bouba-kiki effect has found that people are more likely to associate names to objects which have a more congruent sound-symbolic relationship. This thesis has three main research questions; (1) is there a bouba-kiki effect between people’s names and their faces? (2) Are there any affective consequences for having a congruent versus incongruent name? (3) Are there real-world consequences of the social bouba-kiki effect?

To answer the first research question, two studies (Study 1a and 1b: Chapter 3) were conducted to explore a social bouba-kiki effect. Initially a sample of caricatures were used as stimuli which was followed by a sample of real faces. In both cases participants were asked to name faces from a selection of sound symbolic (i.e. congruent) and non-sound symbolic (incongruent) names. The results clearly showed that congruent names were preferred to incongruent names: participants believed that “round” names (names which contained mostly round vowels /o/ and /u/, as in the names “Bob” and “Ron”) were more suitable for people with round faces, and “spiky” names (names which contained mostly unrounded vowels /i/ and /e/, like in the names “Rick” or “Mike”) for people with angular faces.

To answer the second research question several studies were conducted to examine the affective consequences between a congruent and incongruent name-face relationship. Studies 2a and 2b (Chapter 4) demonstrated that congruently named people were rated more positively on liking and other social dimensions compared to incongruently named people. Studies 3 and 4 (Chapter 5) showed that participants increased their liking for people after learning that they had congruent versus incongruent names, while Studies 5-7 (Chapter 6) showed the reverse, that people were more likely to be assigned congruent names when they were likeable versus unlikeable.

Finally, the third part of the thesis, (study 8: Chapter 7) explored whether the findings could be applied to real world settings. A sample of politicians was used to examine the impact each candidate's level of name-face congruency had on their vote-share. Results showed that politicians with congruent names won their elections by significantly larger margins than those with incongruent names, although the effect was limited to extreme cases of (in)congruency.

Taken together, the studies from this thesis support the hypothesis of a social bouba-kiki effect: how people name faces is not necessarily arbitrary. Furthermore, there are ramifications to having a congruent versus an incongruent name: name-face congruency has an affective component of increasing positivity. What is more, the effect can be detected in the environment, albeit in more extreme samples, where people who have good name-face congruency experience better outcomes than those with poor name-face congruency.

Acknowledgements

First and foremost I thank my God and Saviour Jesus Christ, without whom I wouldn't exist nor be able to complete this thesis.

Secondly I would like to extend my thanks and love to my wife Ruan Barton, and my three daughters Rebekah, Abigail and Hannah for their continued support and understanding during my time at the University of Otago. I have completed this thesis relatively late in life which has meant my family have had to make several sacrifices and concessions due to me being a fulltime student. They have done so exceedingly well.

Thirdly, I would like to thank my supervisor Jamin Halberstadt for his guidance and supervision expertise during the four years we have worked together. When I started at Otago University in 2012, I had no idea which supervisor to approach. Somehow, through either divine guidance or serendipity, I found myself knocking on Jamin's door – thankfully that was the best decision I could have made. I have really enjoyed working with Jamin and have hugely benefited from his in-depth knowledge of social psychology and statistical analysis. As such, getting through this thesis is a huge credit to Jamin and his commitment to the work we have undertaken over the past few years.

I would also like to thank the numerous individuals in the Social Cognition Lab (AKA Jamin's Lab), who have had an impact on my work. Through regular interactions and discussion this thesis slowly took shape, and some of that can be directly attributed to the interactions I had with members of my lab. There is an African proverb which says "it takes a village to raise a child", well it can also be said then, that it takes a supportive lab to raise a thesis.

Contents

List of Tables

List of Figures

Chapter 1: Introduction

Mainstream linguistics has consistently denied any systematic relationship between words and the objects they refer to (De Saussure, 2011; Gasser, 2004), assuming that the connection between a referent and its label is purely arbitrary. Nevertheless, in certain domains adults, toddlers and even infants show a particular mapping bias when associating certain words to shapes, even though there appears to be no particular reason for making such non-arbitrary mappings (Kohler, 1947; Mauer, Pathman & Mondloch, 2006). One of the earliest accounts demonstrating this effect was reported by Sapir (1929b). He found that the majority of people (≥ 80%), when given a choice, chose the non-word 'Mil' to describe a small table and the non-word 'Mal' to describe a large table. This particular bias appeared to be a function of systematically mapping the phonetic features of the sound onto the physical characteristics of the object. This is commonly referred to as cross-modal correspondence and is defined as the tendency of an experience in one sensory modality to be matched with a feature or attribute with another sensory modality (Spence, 2011).

There are at least two classes of cross-modal correspondences: sound symbolism and shape symbolism. Sound symbolism is defined as the association between specific speech sounds and the particular stimuli they symbolise. A well-known example of this is onomatopoeia, which refers to words that resemble, imitate or denote a sound. Words like whizz, bang, splash and thump are onomatopoeic words (Bredin, 1996), as they symbolise the acoustic properties of the sound the word refers to. Another example is when words with the letter 'i' are associated more with smallness compared to words containing the letter 'a' (Sapir, 1929b). On the other hand shape symbolism is the association between abstract shapes and other sensory modalities. An example of this is the case where people associate the oral-somatosensory carbonation of sparking water with more angular shapes and still water with more rounded shapes (Chandrashekar et al., 2009). In this thesis I will largely focus on sound

symbolism as my research focus relates predominantly to the sound of personal names and how they associate with people's faces.

Section 1: The bouba-kiki Effect

The first reported example of a non-arbitrary association between certain sounds and shapes occurred on the Spanish speaking island of Tenerife. Kohler (1947) reported that Spanish speakers were more likely to associate rounded curvy shapes (Figure 1) with the novel word "baluma," and spiky angular shapes with the novel word "takete," than the reverse. Subsequently Holland and Wertheimer (1964), investigating "fittingness" between nonsense words and shapes, found that psychology students were more likely to associate rounded shapes with the nonsense word "Maluma," and angular shapes with the nonsense word "Takete". A more neutral word "Kelu" was found to fall more in the middle of the fittingness scale.

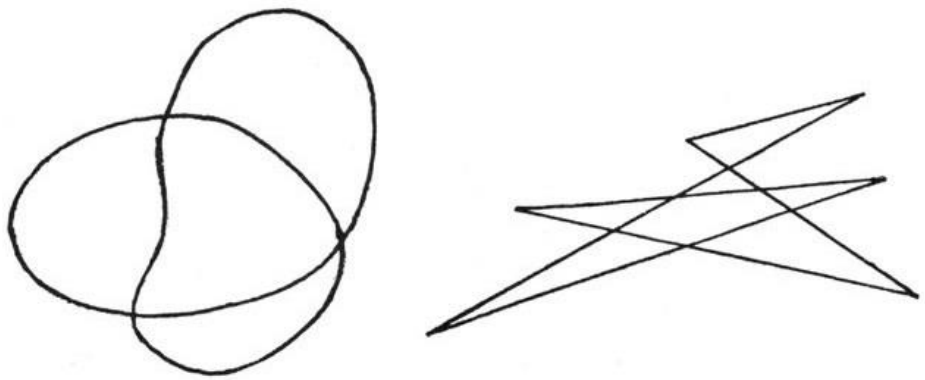


Figure 1. Images used in bouba-kiki experiments (Kohler, 1947).

More recently researchers found a bias among American college undergraduates and Tamil speakers in India who matched curvy and spiky shapes with the novel words "bouba" and "kiki" respectively, coining the term 'bouba-kiki' effect to describe the phenomenon

(Ramachandran & Hubbard, 2001). Maurer, Pathman, and Mondloch (2006) showed that children as young as 2.5 years of age exhibited the bouba-kiki effect, and even younger 4 month old infants, with minimal language development, showed similar tendencies (Ozturk, Krehm, & Vouloumanos, 2013).

The bouba-kiki effect is not only robust across age, but also across culture. In addition to the aforementioned research on Spanish, American and Tamil speakers (Ramachandran & Hubbard, 2001), Davis (1961) found sound-shape symbolism in a sample of Mali school children. The children showed a strong tendency to match the angular shapes with the word "Takete" and the rounded shapes with the word "Uloomu". Recent work conducted on a very remote tribe in Northern Namibia, who have had very little exposure to Western culture and do not use a written language showed a strong tendency to map nonsense words to shapes in the same manner as other sample groups (Bremner et al., 2013).

The 'bouba-kiki' effect has also been shown to exist across other pairs of senses, such as taste and smell. For example Ngo, Misra, and Spence (2011) have demonstrated cross modal correspondences between the visual angularity of shapes and the bitter taste of chocolate. In this study, the participants were given chocolate to taste which varied on the degree of cocoa (30% milk chocolate, 70% dark chocolate and 90% dark chocolate). They had to taste each sample and then place a mark along an analogue line which was anchored at one end with a rounded shape and at the other with an angular shape. The results revealed that as the cocoa content increased (making the taste more bitter) participants tended to place marks closer to the angular end of the line. They were also inclined to map bitterness onto sharper sounding words like 'Tuki' and 'Takete' rather than the alternatives 'Maluma' and 'Lula'.

D'Onofrio (2014) conducted a study using common kitchen objects and asked participants to label objects with non-words like /pimə/ and /pumə/[1]. The labels were varied on vowel content while keeping consonants constant. The results corroborated previous research, showing that kitchen objects judged as round were matched more with rounded nonsense words containing back vowels /u/ and /ɑ/ and kitchen objects deemed spiky were matched more with spiky nonsense words containing front vowels /i/and /e/. However the experimenters noted that the findings could be confounded by the fact that kitchen objects already have common names or that matching could be due to the physical size of the objects, as front vowels have been associated with small size and back vowels with large size (Ohala, 1994). These limitations aside, the study clarifies some of the specific object properties listeners use to develop or reinforce sound-symbolic associations with objects in the real world (D'Onofrio, 2014).

Origins of the bouba-kiki effect

Researchers have proposed several theories which attempt to explain the cause of the bouba-kiki effect. One theory suggests that the effect may arise from cortical associations between the visual perception of shape, observation of the shape of the speaker's lips, and feeling the tongue's inflection and movement when saying or mimicking the word (Ramachandran & Hubbard, 2001). For example an infant might see his father holding a spoon, who then says "spoon", rounding his lips as he says the word. The infant consequently mirrors the sound and feels the inflection of his tongue in his own mouth, at the same time associating the roundness of his father's lips to the round shape of the spoon. Thus he connects neurologically the various components which cause the sound symbolic association between objects and their names.

[1] Ə represents the near-open front unrounded vowel sound as in "away" or "banana"

Hence these neurological underpinnings may have their root in developmental processes. The function of forming these connections may commence in infancy, and is possibly a reflection of the frequency of observing the same occurrence repeatedly where certain speech sounds are systematically associated with particular objects by speakers of the infant's language (Bremner et al., 2013).

Other evidence of the bouba-kiki effect being a result of language development is found in research which shows that vowels tend to correspond with the size of objects. Across languages there is tendency to systematically map the properties of objects, such as the size of an object, to its speech sound. Evidence suggests that low back vowels |o| and |u| are consistently matched to large objects and high back vowels |i| and |e| to small objects (Sapir, 1929a). This effect has even been demonstrated in infants as young as 4 months who systematically mapped larger objects to |o| and |u| and smaller objects to |i| and |e| (Pena, Mehler, & Nespor, 2011). This tendency to map the properties of objects to their physical size may be based on the fundamental frequencies (F_o) of vowels. Whalen and Levitt (1995) found that high front vowels |i| and |e| tend to have higher fundamental frequencies than low back vowels |o| and |u|. Objects which are thinner or smaller tend to produce higher pitch than larger, wider objects. Cellos for example are larger instruments that play notes which are lower in pitch than their cousins Violins which play notes of much higher pitch. If people systematically map the pitch of a vowel to the size of an object, then this lends support to the idea that there is an association between the fundamental frequency of a word and the object it refers to. While young children are developing their language skills, they may encounter many occurrences where object size and sound are closely linked, for one reason or another, and the bouba-kiki effect is one outcome of this non-arbitrary linking of names to referents.

The way humans develop language may mirror how communication develops amongst other species as well. Rendall and Owren (2010) argue that vocalizations are non-

arbitrary and may confer a survival advantage, observing that animals in the wild use a style of communication consistent with their current predicament. For example, primates and other species use harsh, noisy and punctuate sounds (i.e. strident) which are normally concomitant with high arousal situations, danger or aggression. In contrast to this they usually use sounds which are smoother and more harmonic (i.e. sonorant) in situations of low arousal and positive affiliation and contact. An example of this can be seen in how baboons communicate danger to each other through “barks”, “screeches” or “screams” when a predator is present. In situations like these, non-arbitrary sound mappings are vital for survival as baboons may not survive long by making soft “cooing” noises in the presence of a leopard. The same effect can be seen in babies who communicate distress through screams and crying. This sharp unstructured sound elicits an immediate response in caregivers who attend to the child’s calls (Nielsen & Rendall, 2011). This non-arbitrary manner of communicating distress is vital to infants getting their needs met, and when reinforced leads to certain patterns in communication becoming entrenched. This might indicate clues to how language develops in infants who learn to associate certain speech sounds to situations which they encounter, for example, loud cries when they are hungry or have a wet nappy. This might also be how infants learn to associate certain speech sounds like “bouba”, for example, to rounded objects, because they observe a speaker’s mouth movements when pronouncing the words to describe those objects (Pena et al., 2011). Hence, from an early age infants learn through repetition that certain speech sounds are more associated with certain situations or objects, and these associations become entrenched.

Name Stereotyping

The bouba-kiki literature demonstrates that words that are acoustically rounded are systematically associated with rounded objects, while words that are acoustically angular are mapped to pointy objects. This thesis draws from these ideas, testing the possibility of a

"social bouba-kiki effect": *people* also vary in shape, so it is plausible that *their* names may be seen as more or less suitable for them. Furthermore, the match between a person's shape and their name could have important social consequences. Objects don't care about what they are named but people do. Research shows that our names do in fact impact on our lives and have important social implications; hence we do or at least should care about what name we have been given or give to another person.

Evidence suggests that there is an association between names and social characteristics. For example, for some first names, the name holder is judged as less intelligent or less popular than is actually the case (Mehrabian, 2001). Banaji and Hardin (1996) have demonstrated that people hold certain hidden biases for first names. The researchers paired certain adjectives with characteristically Black or White names and measured participants' response times according to how well matched they thought the pairs of words were. Results showed that for all participants, including African Americans, response times were quicker (indicating a more suitable match) when a positive word was paired with a "White" name and a negative word was paired with a "Black" name, than vice versa.

Bertrand and Mullainathan (2002) have shown that a name bias also exists in the workplace. They submitted four resumes to "wanted" ads placed in the local newspaper and carefully balanced the applicants' names between White-sounding names like Brad, Greg, Matthew and Neil, and Black-sounding names like Darnell, Hakim, Jamal and Tyrone. They found that White names elicited 50% more call-backs than Black sounding names. The quality of the resumes had no effect. The person's name alone carried the power of determining whether they received a call back, thus exerting tremendous influence on their employability.

In a similar study the researchers found that the racial perception of a job applicant's name can considerably affect his or her chances of gaining a job interview (Bertrand & Mullainathan, 2004). The researchers submitted 5,000 job applications to advertised jobs, all with identical credentials, but changed the applicants' names to either sound African American (e.g., Latoya, Rasheed) or White (Sarah, Brad). Once again the applications containing White sounding names gained significantly more interviews than applications containing Black sounding names.

Name-based discrimination may also occur early in school life. For instance, Anderson-Clark, Green, and Henley (2008) examined teachers' perceptions of student achievement based on their first names and their ethnicity. One hundred and thirty elementary school teachers were asked to rate the behaviour and characteristics of a student based on a short vignette. There was a significant effect based on the student's first name, as teachers gave a considerably lower achievement scores to students with the African-American sounding names (e.g. Xavier) compared to the Caucasian sounding names (e.g. Ethan).

Research by Figlio (2007) suggests that boys who have been given names commonly given to girls are more prone to misbehaviour as they grow older. For example, boys given the names Alexis, Courtney, Kelly or Shannon were more likely to be suspended from school than other boys. He studied data on names, classroom assignment, behaviour problems and student test scores from information collected from a large school district in Florida, USA. The results showed that boys with typically female sounding names misbehaved disproportionately more than other boys when entering middle school and that their behaviour had negative ramifications on their peers as well.

An interesting study which examined the names of over 15,000 names from a database from a large US state[2] shows that regardless of race, juvenile males with unpopular,

[2] Due to confidentiality concerns the authors signed an agreement not to divulge the identity of the state they used.

uncommon or feminine names were more likely to get into trouble with the law (Kalist, Lee, & Spurr, 2015). Boys like Michael, Joshua and Christopher were more likely to steer clear of trouble than boys like Kareem, Walter or Ivan. The researchers stated that having an unpopular name was not likely to be the cause of committing more crime, but factors associated with those names may have made an impact. Boys with uncommon names may be subject to more name calling, come from lower social economic homes or single parent homes and face more discrimination in the workplace. Juveniles may also be prone to acting out because they don't like their names. The top ten names most associated with crime according to the study were Alec, Ernest, Garland, Ivan, Kareem, Luke, Malcolm, Preston, Tyrell and Walter.

A person's name can also affect their attractiveness. Research found that girls who were previously rated as equally attractive , were rated as more attractive when they were given a desirable[3] name (at the time, Kathy, Christine, or Jennifer) compared to an undesirable name (Ethel, Harriet, or Gertrude) (Garwood, Cox, Kaplan, Wasserman, & Sulzer, 1980). In another study, Erwin (1993) found a similar effect for women, but not for men. Women who had an attractive name accompany their photograph were rated as significantly more attractive than when they had an unattractive name.

Face Stereotyping

Research reviewed in the previous sections shows that names do carry important social consequences for the name holder. However, the names assigned to individuals in those cases were not linked necessarily to any particular physical aspect of the individual (like the shape of their head or body). My interest in this thesis is to explore whether a person's name can be a good fit for their face by matching the acoustic properties of the

[3] Name desirability was determined by asking students to rate names on various factors, including desirability of the name.

sound of the name with the physical characteristics of the shape of their face: a social bouba-kiki effect.

Although no study has tested for sound symbolism between names and faces, one study found that some names were judged a better fit to certain faces, and that the match influenced the efficiency with which the faces were learned (Lea, Thomas, Lamkin, & Bell, 2007). In an initial study the researchers asked one group of participants to draw faces they thought best matched one of 15 names (Bob, Bill, Mark, Joe, Tim, John, Josh, Rick, Brian, Tom, Matt, Dan, Jason, Andy, and Justin). A second group of participants sorted the faces into good and bad examples of each name, and faces with greater than 50% agreement were retained as prototypes. Then, a third group of participants were asked to match the faces to names. In most cases (67%) participants chose the name of the prototype face.

The researchers went on to investigate the hypothesis that matched name-face pairs would be easier to learn than pairs which were not ideally matched (Lea et al., 2007). They placed participants in conditions in which faces and names varied in association strength. Participants were tasked with learning the names of the faces. Name-face pairs were easier to learn when they were well-matched than when they were poorly-matched. One explanation offered was that there was a cross-modal interaction between the sound of the name and the physical features of the face. When articulating the name, the acoustic features of the sound were integrated into the physical features of the face and via versa. The researchers postulated that “Bob”, for example, is an acoustically rounded name which suggested roundness, and thus symbolised roundness of the face (Sapir, 1929b). However, no data were presented to substantiate this mechanism. The first goal of the current thesis is to test a specific mechanism of name-face fit, namely a social bouba-kiki effect by which people with round and angular faces are judged more likely to have round and angular names, respectively.

Section 2: The Consequence of Having Well-Fitting Name

A second goal of the thesis is to explore the affective implications of the social bouba-kiki effect. Previous research suggests that, not only should round and angular names be judged as more suitable for people with round and angular faces respectively, but that people will be liked better, and perhaps enjoy other social benefits, when their names are well-matched.

Expectancies

Why would people judge others more favourably when their name is a good fit for their face? One reason might relate to the general bias people have toward experiences that fit their expectations or their schemas about the world. General research on expectancies demonstrate that when people have their expectations met, it usually results in more positive affect, or an increase in certain behaviours. For instance, patients whose GP's met more of their consultation expectations reported feeling more satisfied with their GP's than those who did not have their expectations met (Williams, Weinman, Dale, & Newman, 1995). In a study involving counselling, it was found that when clients' expectations for reassurance and advice were met, they experienced less anxiety and concern compared to those whose expectations were not met (Michie, Marteau, & Bobrow, 1997). In another study, it was found that year 9 students who did not drink alcohol, were more likely to begin drinking alcohol, if they expected drinking to relate to more positive social interactions (Killen et al., 1996). Furthermore, studies on sound symbolism show that information contained in product name brands and shape symbolism contained in the packaging and labelling could help foster the appropriate sensory response in the minds of consumers (Spence, 2012). Consumers like food and drink more when the product labels are similar to the sensory expectations they hold about the product (Deliza, MacFie, & Hedderley, 2003; Yeomans, Chambers, Blumenthal, &

Blake, 2008). It may be that the product label fosters certain expectations about the taste of the product for example, and if this expectation is met, people like the product more. In terms of people and their names, this implies that when we meet people who have names we expect them to have, we might like them more because they meet our name-face expectations we hold for them. Lea et al. (2007) found evidence to support this contention, when they showed that ideally matched names and faces were more memorable, because when a person possessed a name which met their expectations they were easier to remember. Hence we may like others whose names are positively associated because, for one reason or another, they are the ones we expected them to have.

Congruency

Another reason to suspect that people will prefer others with "matching" names is the wide body of research showing a bias toward congruent versus incongruent stimuli and situations (Nickerson, 1998). Studies on postural congruence have found that people who sat in similar chairs liked each other more than those who sat in different chairs, because they adopted a similar upper body posture (Maxwell & Cook, 1985). In another study, counsellors who mirrored the arm and leg position of their clients were rated as having significantly more empathy in the congruent condition than in the incongruent condition (Maurer & Tindall, 1983).

Furthermore, studies in cross-modal emotional perception reveal that pairing an emotional face with a congruent emotional voice leads to greater ability to recognise facial emotions (De Gelder & Vroomen, 2000), and even infants tend to dwell longer on faces which have congruent voices accompanying them than when the voices were incongruent (Walker-Andrews & Grolnick, 1983). Still more research conducted on shoppers' behaviour, found that shoppers were more favourable to the store and its merchandise when the ambient scent in the store was congruent with the gender-based products sold in the store, compared

to when the ambient scent was incongruent. This was found to increase approach behaviours like spending more money in the store (Spangenberg, Sprott, Grohmann, & Tracy, 2006). Similarly, other studies have shown the effects of olfactory congruency, that congruent odours enhance product evaluations (Bone & Jantrania, 1992), and increase information processing as well as altering choice behaviour (Mitchell, Kahn, & Knasko, 1995).

One explanation of these biases, according to Mitchell et al. (1995), is that when odours are congruent with their respective products, it leads to cognitive enrichment or an increase in cognitive flexibility, whereas when there is little or no match between a product and its odour, cognitive interference occurs. Hence, when information in memory is activated which is incongruent, it takes more cognitive energy to process and makes processing more difficult for the consumer.

Processing difficulty, also known as "fluency" provides, in turn, a mechanism by which affect can "attach" to congruent stimuli. According to Reber, Schwarz, and Winkielman (2004), the ease with which a stimulus can be perceived and processed results in greater liking for it and it also leads to more activation in the zygomaticus major muscle, (AKA the 'smiling' muscle) (Winkielman & Cacioppo, 2001). Stimuli which have been made more fluent through various means such as perceptual priming, higher contrast or presenting them at longer durations, are detected more easily and rated more positively than less fluent stimuli (Reber, Winkielman, & Schwarz, 1998). Similarly, faces that are congruent with their names may well be more fluent than incongruent faces, and consequently will be rated more positively. Consistent with this explanation, one study found that participants were faster at pairing rounded shapes with the nonsense round word 'mot' and angular shapes with the spiky word 'riff' (Kovic, Plunkett, & Westermann, 2010). Although Kovic et al. (2010) never explicitly asked participants how much they liked the objects named "mot" or "riff",

perceptual fluency would suggest they would have rated congruent pairings more positively than incongruent pairings.

Similarly it might be that less cognitive effort is required to process a congruently named person and this reduction of effort leads to increased liking for the individual. Evidence for this was found by Forster, Leder, and Ansorge (2013) who found that images which were objectively more fluent were also subjectively judged as more fluent and were rated higher on likeability. Fluent information is also easier to learn and recall. As described above, Lea et al. (2007) found that participants learned name-face pairs more easily when they were well-matched, compared to when they were poorly-matched.

It appears then, that when stimuli are processed "fluently", it requires less cognitive effort to process them, which in turn leads to an increase in positivity. My contention is therefore, that faces which are objectively more fluent (have a high level of name-face congruency) will likewise lead to greater positivity towards them.

Overview of Thesis

In this thesis I proposed three main research questions; (1) Is there a bouba-kiki effect between people's names and their faces? (2) Are there any affective consequences to having a congruent versus incongruent name? (3) Are there any real-world implications of the social bouba- kiki effect?

To answer the first research question, which was if there is a bouba-kiki effect between people's names and faces, I conducted two studies. Study 1a and 1b (Chapter 3) explored if a bouba-kiki effect exists between male first names and faces. Firstly, I used a sample of caricatures before moving on to real faces. In both cases I asked participants to name faces from a selection of sound symbolic (i.e. congruent) and non-sound symbolic (incongruent) names.

The second research question investigated affective consequences for having a congruent versus incongruent name. Several studies were conducted to examine the association between congruent naming and affect. Studies 2a and 2b (Chapter 4) examined firstly if there was an affective consequence to having a congruent versus incongruent name (Study 2a), and following that, if there was any particular personality trait more or less associated with congruent-naming (Study 2b).

In Chapters 5 and 6, I tested the causal directions of the effect. In Studies 3 and 4 (Chapter 5), I tested the hypothesis that congruency between name and face increased positivity. The aim of Study 3 was to determine whether the act of assigning congruent or incongruent names to targets, would increase or decrease liking for them. I wanted to explore if the effect of congruency produced an increase in positivity which benefited the target with an increase in liking. In study 4, rather than having participants choose names for targets, I assigned congruent and incongruent names to targets. The aim of the experiment was to explore whether participants expectations of names for targets would influence their liking of targets; i.e. would liking increase when participants discovered the target had a congruent or incongruent name? In studies 5-7 (Chapter 6), I tested the reverse causal path, that liking someone more due to some quality they possessed, like being more attractive or smiling versus non-smiling, would result in more congruent-naming.

In the third part of the thesis (Study 8: Chapter 7) I explored whether the research could be applied to real world settings. Using a sample of politicians, I examined the impact their name-face congruency had on their electability. The aim of this study was to determine if politicians with congruent names won their elections by significantly larger margins than those with incongruent names.

Overall, the evidence showed that a social bouba- kiki effect exists, and that there are affective and social consequences for people who violate it. In Chapter 8, I consider some of

these consequences, examine some of the limitations of the thesis as a whole, and propose additional questions, theoretical implications, applications and ideas for future research.

Chapter 2: Round and spiky faces and names - Methodological Considerations

Before testing the hypothesis that round and spiky people will be associated with round and spiky names, these terms must be defined and operationalized. In this Chapter, I define the meaning of these terms with respect to people's faces and their names, and I examine how the physical dimensions of these stimuli map onto their psychological representation and subjective experience. I will argue that "roundedness" is both a physical and a psychological dimension of a name and face, and that the two are empirically and causally related, and ultimately that either can predict how suitable a name is for a person's face.

Face validation

Although human faces are to some extent uniform in shape due the structure of the skull, there is variance in how rounded they are, and the appearance of roundedness can be further enhanced or attenuated by body fat, hair style and adornments (e.g., piercings). For example Lustig (2012), has suggested that a woman can make her face appear slimmer by wearing eye catching, long, dangly earnings.

The shape and/or perceived shape of a person's face is not trivial. Research has revealed the presence of neurons specifically tuned to face shape (Jiang et al., 2006), which influences a variety of social judgments (Wong, Ormiston, & Haselhuhn, 2011). For example, men who have rounded faces are perceived as more aggressive and dangerous than men with more angular faces (Haselhuhn, Ormiston, & Wong, 2015). Indeed, men who have rounder faces describe *themselves* as more aggressive, uncooperative and prejudiced than men with smaller and more angular faces (Geniole, Denson, Dixson, Carre, & McCormick, 2015).

In order to validate potential stimulus faces it is important that they vary systematically on both objective and subjective dimensions of roundedness: not only must "round" faces have a rounder shape than "spiky" faces, but perceivers must also agree on which faces are round and spiky. The former has been quantified using facial anthropometry landmarks.

Anthropometry is the biological science of human body measurement (DeCarlo, Metaxas, & Stone, 1998). Anthropometric measurements can be used to design products which fit most people (Dooley, 1982), assist in the planning and assessment of plastic and reconstruction surgery (Farkas, 1994), help in determining the appearance of people from their remains (Rogers, 1987), permit accurate "aging" of missing children to assist in their recovery (Farkas, 1994), or to design face models for computer graphics (DeCarlo et al., 1998). Farkas (1994) describes a widely-used system of anthropometric landmarks for the human face, which I used in operationalising 'roundedness' for the purposes of this thesis. Specifically, the shape of the lower face was calculated by using 2 of these anthropometric landmarks from Farkas' inventory (Figure 2).

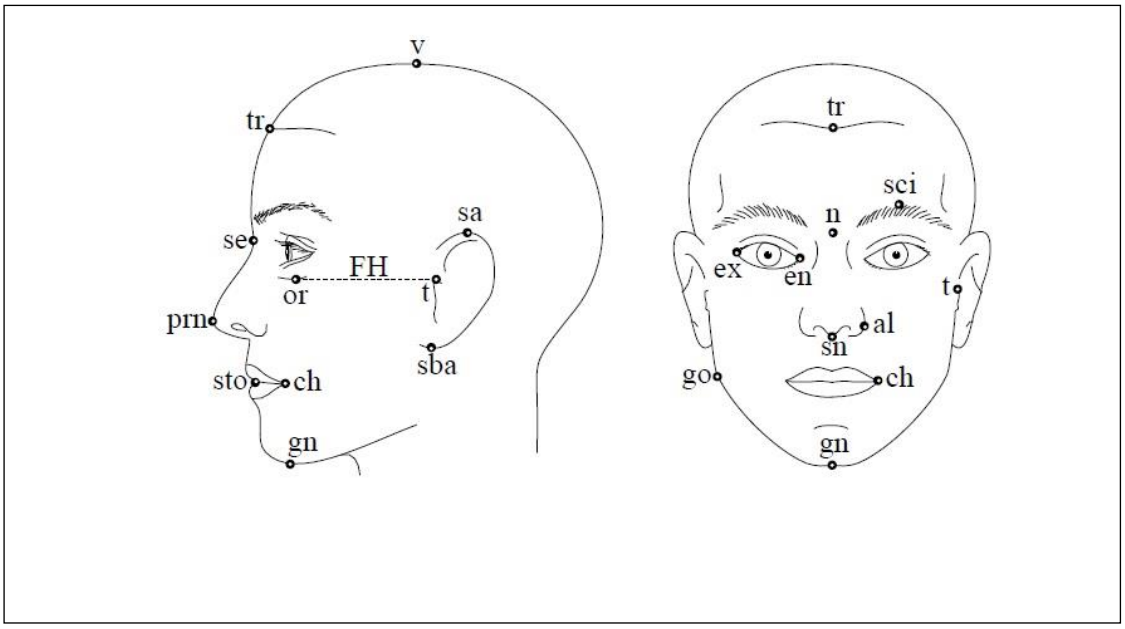


Figure 2. Farkas' (1994) inventory of anthropometric landmarks on the face.

An angle was computed by drawing a line from the base of both ear lobes (Figure 2 landmark ‘sba’) to the tip of the chin (Figure 2 landmark ‘gn’). Using this novel method, the example faces in Figure 3 have angles of 70° and 120° respectively, the latter representing a rounder face than the former.

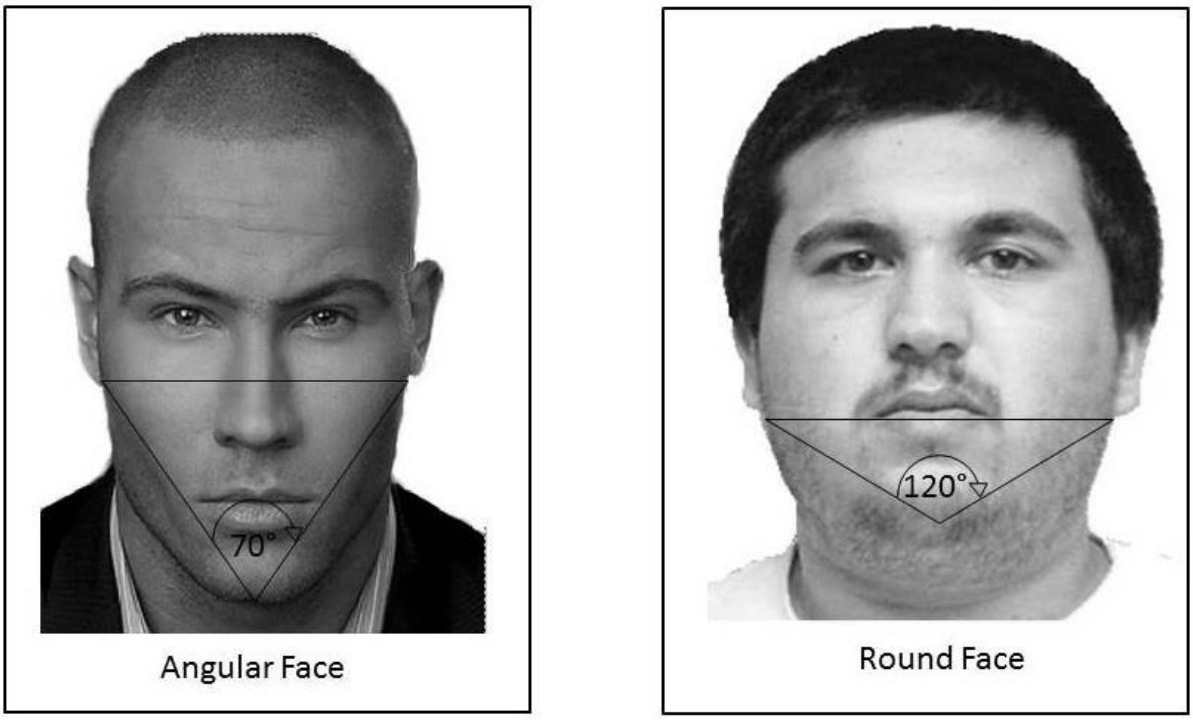


Figure 3. Lower face angles for an angular and round face.

With this operationalising of roundedness in mind, I compiled a stimulus pool of ‘round’ and ‘spiky’ male faces[4], drawing on several university databases and online sources, including the Facelab database (Rhodes, personal communication), the Stirling face database (http://pics.psych.stir.ac) and the Karolinska Directed Emotional Faces database (Lundqvist, Flykt, & Öhman, 1998)(see Table 1 for all databases used). These were supplemented by online searches of Google and Bing images using search terms such as, “man with round face”, “round faced man”, “man with angular face” and “spiky face”. Faces were chosen if they were relatively round or spiky in appearance, forward facing with a neutral or

[4] To minimise error variance due to gender we chose to only use male faces throughout the thesis.

(occasionally) positive expression[5], of high image quality, and Caucasian. The search resulted in a pool of 267 faces, details which appear, along with their lower face angles, in Appendix A.

Table 1

Details on faces used to create the stimulus pool, which includes where faces were sourced from, how many participant raters were assessed, where raters originated from, the numbers of faces rated, Inter-rater reliability across each stimulus set and the Parsons correlation between objective and subjective roundness ratings.

Sample set	**Sourced**	**No of raters**	**Source of raters**	**No of faces rated**	**Inter-Rater correlation Cronbach's alpha**	**Correlation between subjective roundness & lower face angle**
1b Real Faces Study	Google images, Bing Images, "Face Lab" University of Western Australia	64	University of Otago	32	.99	.85
General survey 1	Google Images, Bing Images, www.en.wikipedia.org,	110	Mechanical Turk	40	.99	.92
General survey 2	Google Images, www.en.wikipedia.org,	106	Mechanical Turk	40	.99	.93
Attractive/ unattractive	Google Images, www.en.wikipedia.org, "Face Lab" Uni Otago Domain	97	Mechanical Turk	82	.99	.86
Smiling/ Neutral	1.) Radboud Faces Database - http://www.socsci.ru.nl:8180/RaFD2/RaFD?p=main, 2.)Stirling Faces - http://pics.stir.ac.uk/2D_face_sets.htm, 3.)Winfaces - otago lab, 4.)Karolinska Face Database4 - http://www.emotionlab.se/resources/kdef	105	Mechanical Turk	73	.94	.82

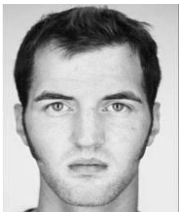
Subjective face ratings

To quantify the subjective "roundness" of these faces, 482 participants, sourced from Mechanical Turk[6] and the University of Otago, were asked to rate the stimulus faces across 5

[5] Some faces had a neutral and smiling version of the same person, but only the neutral version was used to gain subjective and objective ratings of face shape. We did not match positive expressions in frequency across conditions.

separate surveys. Table 1 provides additional details related to these surveys such as the number of participant raters, where they were sourced from, the number of stimuli they rated, Cronbach's alpha across each survey, and the correlation between subjective ratings and objective measurements of face shape.

An example of the instructions given to participants were:

> This survey is about the intuitive "feel" of people's faces. We are especially interested in the "roundness" or "spikiness" of a face. You might notice that some people's faces intuitively look rounder or spikier than others. For example, many people say that the face in Picture 1 looks very round, while the face in Picture 2 looks very spiky.
>
> Picture 1 Picture 2
>
>  
>
> Today, you will be presented with 73 male faces. Your task is simply to rate each person's face on how round or spiky it looks, using a scale from 1 (very round) to 9 (very spiky)."

Participants rated each face on a scale of 1 to 9, anchored at 1 "very round" to 9 "very spiky" (Figure 4).

[6] Amazon's Mechanical Turk is a community of "workers" who volunteer for short research studies (among many other tasks) in exchange for nominal payment.

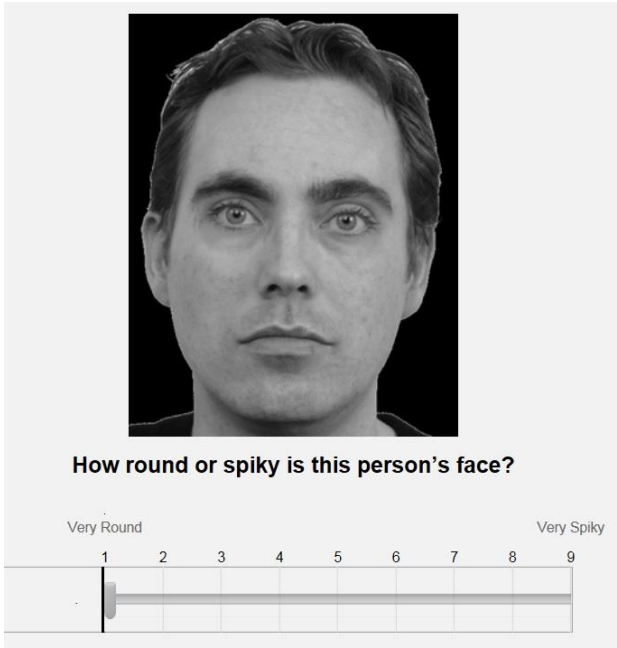


Figure 4. Example of a trial in face rating survey.

Results showed (Table 1) that Cronbach's alpha was very high for all sample sets. Furthermore, the correlation between objective and subjective ratings of roundedness was high across all sample sets. Thus ratings were consistent across all measures of roundedness for face shape.

How vowels shape the mouth

In order to understand how the physical dimensions of names are experienced psychologically, I will briefly examine how we articulate certain speech sounds – particularly vowels. In the English language, a vowel sound is produced by the unimpeded flow of air through the vocal tract (Figure 5), with no air building up at any point above the glottis (the opening between the vocal cords at the upper part of the larynx).

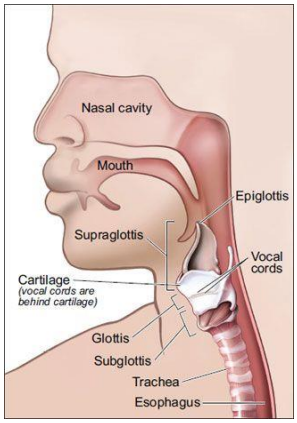


Figure 5. Glottis and other vocal components involved in speech (Healthwatch, 2015).

A vowel sound is made by shaping the air as it leaves the mouth, which causes the mouth to take on a particular shape depending on where the tongue is situated during articulation. The basic vowel dimensions are generally viewed as tongue position and the rounding of the lips during articulation. According to Figure 6, the tongue position can be specified along a vertical (high, mid and low) and a horizontal (front, central or back) dimension, and the degree to which the lips are rounded when forming a vowel is a consequence of the tongue's position. For example, when the tongue is higher and back in the mouth the lips are usually rounder, but when the tongue is more forward and higher in the mouth the lips spread more or unrounded.

In the English language there are five written vowels: /a/, /e/, /i/, /o/ and /u/ which can be combined to produce over twenty spoken vowels (Crystal, 2004; Deterding, 2004). An example of a spoken vowel is [ei] as in "late" or "make", represented by the written vowel /a/; the spoken vowel [ai] as in "ice" or "find" is represented by the written vowel /i/. Figure 6 shows the placement of spoken vowels as they relate to the vertical and horizontal positions of the tongue. The additional dimension of "roundness", which according to linguists is the posture of the lips during vowel articulation (Lisker, 1989), can also be seen in the Figure. For example the vowel /i/ is expressed when the tongue is higher at the front of the mouth. This also causes the lips to spread, which corresponds to the unrounded shape of the lips. The

/a/ vowel is more central and lower, while the /u/ vowel is positioned high in the back of the mouth which causes the lips to round. The positional aspects of the tongue when articulating vowels causes the mouth cavity to change in size, this causes each vowel to resonate ("echo") at different frequencies, and it is these resonances (called "formants") which give each vowel its distinctive sound.

The terms “round” and “spiky” are therefore descriptive of the shape the lips assume when articulating the vowel sounds. I describe a vowel as “round”, when the tongue is high and back of mouth causing the lips to make a round shape, which corresponds to the rounded written vowels /o/ and /u/. I describe a vowel as “spiky” when the tongue moves to the front of the mouth and is positioned higher, causing a spreading of the lips, which appear sharper and pointy. Written vowels expressed at this position are /i/ and /e/. In the centre of the mouth we find the /a/ written vowel, which usually occurs when the tongue is in the middle central part of the mouth. For my purposes, this vowel is considered to be neither round nor spiky.

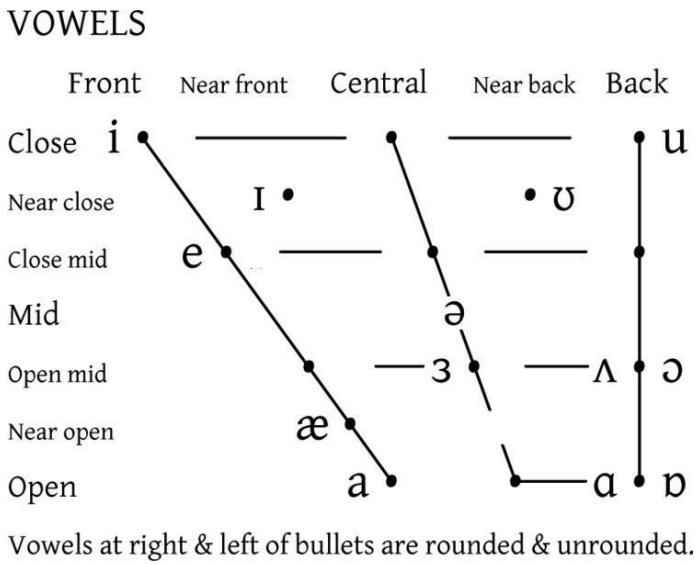


Figure 6. A representation of written and spoken vowels (Ladefoged, 1990).

Vowels and "word shape"

The analysis in the previous section illustrates how vowels shape the mouth by rounding or spreading the lips[7], and this feature has been used as basis for creating stimuli in studies of the Bouba-Kiki effect (Maurer et al., 2006; Ramachandran & Hubbard, 2001; Tarte, 1974; Tarte & Barritt, 1971). Indeed, the non-word "Bouba" itself was created as an exemplar of a "round" word precisely because of the occurrence of /o/ and /u/ vowels which round the lips. Similarly "Kiki" was devised to represent a "spiky"[8] word as it contains the /i/ vowel which spreads the lips. More generally, the ratio of round and spiky vowel sounds in a word permits a quantification of its roundedness, and a classification of names as round and spiky based on the primary vowel type they contain.

Name validation

Based on these considerations, I compiled a database of 80 male names. I sourced sample names from the New Zealand Department of Internal Affairs' website, which lists the top 100 boys and girls names since 1999 (dia.govt.nz, 2011), and from a site listing the top 1000 baby names in the United States (Babynamewizard.com, 2015). In order to validate potential stimulus names it is important that they vary systematically both on objective and subjective dimensions of roundedness: not only must "round" names physically round the lips more than "spiky" names, but perceivers must also agree on which names are round and spiky.

To quantify the objective dimension of roundness, first, each vowel was assigned a ordinal scale score based on the tongue position used to make the vowel sound. For instance, the vowels /i/ and /e/ occur at the front and high in the mouth, thus they were assigned a score

[7] We realise that another component of speech, consonants, is also capable influencing lip shape, however we decided to maintain our primary focus on vowels as according to Dr Hunter Hatfield from the department of English and Linguistics from the University of Otago, vowels are more influential in shaping the lips than consonants.

[8] The word "spiky" was not used in these previous experiments to describe stimuli. Rather previous experimenters described spiky words like "kiki" as angular, pointy and unrounded.

of 3 respectively. The central occurring vowel /a/ was assigned a score of 2 and the back and high positioned vowels /u/ and /o/ assigned a score of 1. By averaging these values across all vowels in a given name, I computed a roundedness score. For example, using this method, “Bob” received a score of 1 (one vowel of roundedness level 1), a highly rounded name; “Rick” received a score of 3 (one vowel of roundedness level 3), a highly spiky name. “Maverick” received a score of 2.7 (two vowels of roundedness level 3, one of roundedness level 2), while “Gordon” received a score of 1 (two vowels of roundedness level 1). Table 2 (Objective Rating) shows the results for subjective and objective roundedness ratings of all 80 names in the database.

Subjective name ratings

To quantify the subjective roundedness of the 80 names, 200 online participants provided shape ratings. Participants were recruited from Amazon’s Mechanical Turk and were paid $0.40 for their participation. After giving informed consent, participants were given the following instructions:

> This survey is about the intuitive “feel” of people’s names. We are especially interested in the “roundness” or “spikiness” of a name. You might notice that some names intuitively feel rounder or spikier than others. For example, many people say that the name "Bouba" feels very round, but the name "Tikiti" feels very spiky. Today, you will be presented with 40 male names. Your task is simply to rate each name on how round or spiky it feels, using a scale from 1 (very round) to 9 (very spiky).

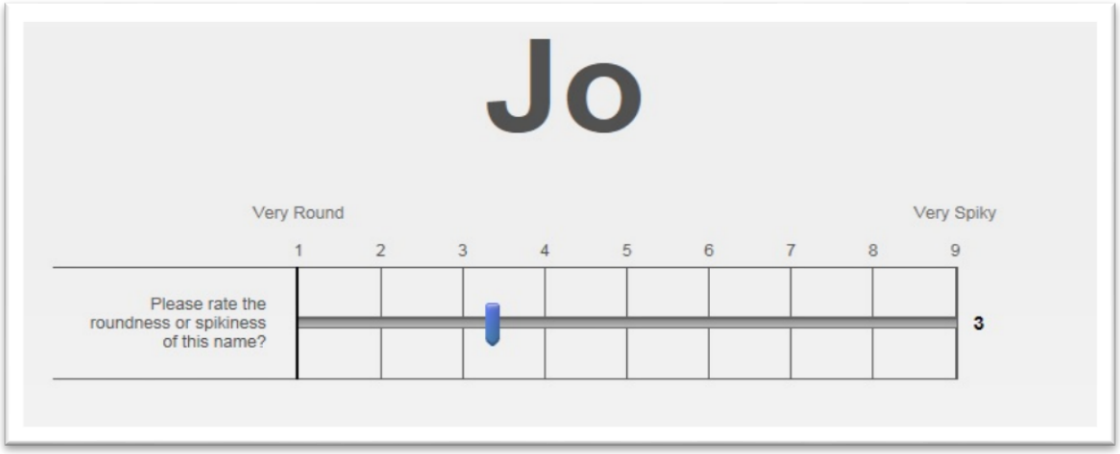


Figure 7. An example of an subjective naming trial.

Each participant rated one of two sets of 40 names, each of which contained 20 classified as round and 20 classified as spiky by the objective analysis described above. Participants rated each name on a sliding scale anchored at 1 ("Very Round") and 9 ("Very Spiky). A screen shot of the rating trial appears in Figure 7. Participants' ratings were averaged to create a single subjective roundedness rating for each name, which appears in Table 2 (Subjective Rating column).

Table 2

Name roundness ratings using subjective measures and objective measures of roundedness. Objective ratings closer to 1 indicate greater name roundedness.

Name	Subjective Rating	Objective Rating	Name	Subjective Rating	Objective Rating
Bob	2.18	1	Michael	5.14	2.33
Bo	2.29	1	Maverick	7.05	2.33
Rob	2.64	1	Zane	5.37	2.5
Bobby	2.69	1	Ivan	5.64	2.5
Odon	2.77	1	Travis	5.64	2.5
Jo	2.88	1	Alvin	5.70	2.5
Gordon	2.93	1	Jarvis	5.79	2.5
Connor	2.96	1	Reza	5.93	2.5
Don	2.98	1	Jake	5.98	2.5
Joe	3.07	1	Alex	5.98	2.5
Tom	3.10	1	Ezra	6.22	2.5

Cole	3.21	1	Larkin	6.47	2.5
Bruno	3.25	1	David	4.67	3
Hugo	3.32	1	Digby	5.13	3
Otto	3.40	1	Peter	5.19	3
Cody	3.42	1	Riley	5.24	3
Josh	3.47	1	Eilian	5.28	3
Bronson	3.48	1	Edwin	5.29	3
Hugh	3.68	1	Will	5.31	3
Todd	3.69	1	Kyle	5.41	3
Bruce	3.85	1	Eli	5.44	3
Jordy	3.85	1	Steve	5.49	3
Jordan	3.86	1	Iggy	5.59	3
Colton	3.90	1	Kevin	5.67	3
Burton	4.18	1	Devin	5.75	3
Tony	4.24	1	Elvis	5.82	3
Kolby	4.32	1	Levi	5.93	3
Noah	2.82	1.50	Vince	5.99	3
Roan	3.00	1.50	Devlin	6.04	3
Ronald	3.26	1.50	Kelvin	6.12	3
Roman	3.35	1.50	Mike	6.23	3
Paul	3.62	1.50	Virgil	6.26	3
Harold	3.74	1.50	Nick	6.60	3
Howard	3.76	1.50	Rick	6.63	3
Arlo	3.81	1.50	Vic	6.68	3
Corban	3.90	1.50	Felix	6.91	3
Aaron	3.27	1.67	Zeke	7.29	3
Dooley	2.90	1.67	Fritz	7.39	3
Zebulon	5.12	1.67	Ike	7.40	3
George	3.30	2.33	Spike	8.05	3

Cronbach's Alpha was run separately over both subjective name rating surveys to determine interrater agreement across each sample set. For both surveys, (1) 102 participants who rated the shape of 40 names and (2) 98 participants who rated the shape of an additional 40 names, Cronbach's alpha was very high. There was excellent agreement between participants subjective name shape ratings; for (1), $\alpha = .99$ and (2) $\alpha = .99$.

A Pearson's Correlation between the subjective and objective ratings revealed a strong positive relation, $r(78) = .86$, $p < .001$. The result suggests not only that the names

have meaningful variance in terms of their roundedness, but also that the roundness dimension has meaning to experimental participants.

Conclusion

In this Chapter, I have demonstrated that both names and faces can be reliably judged in terms of their roundedness, and these judgments do in fact correspond to objective features of the stimuli. In subsequent studies, subsets of these faces and names will be used to test the hypotheses that names are perceived as more suitable when they are congruent with a person's face shape, and that congruently-named individuals enjoy positive social benefits.

Chapter 3: A social Bouba-Kiki effect

Like shapes, people's faces are more or less rounded (Enlow & Hans, 1996). Therefore it is plausible that people's names, which themselves are more or less "round", will be judged as more or less appropriate for them as a function of their "fit". In this Chapter, I explore this idea in two studies. Study 1a uses caricatures as an initial test of the bouba-kiki effect in faces. Study 1b follows on from Study 1a and uses a sample of real people's faces instead of caricatures. In both studies, the hypothesis was that participants would associate round and spiky names with round and spiky faces, respectively.

Study 1a: Is there a Bouba-Kiki effect for human faces?

Method

Participants

The sample consisted of 56 participants who were recruited through the Department of Psychology's Experimental Participation Pool of first- and second-year students. Pool participants satisfied a small portion of course assessment by completing a worksheet based on the experiment. There were 41 female participants (*M* age = 20.3 years; *SD* = 5.2) and 15 male participants (*M* age = 21.5 years; *SD* = 4.8). The majority of participants identified as New Zealand European (85%) and spoke English as their first language (91%). The remainder were Maori, Asian, or Pacifika. Informed consent was obtained from all participants.

Stimuli

Stimulus faces consisted of 20 (10 round and 10 spiky) black and white male faces (see Figure 8 for examples) created with an online face generator (www.pimptheface.com). There were two distinct groups of faces: "round" faces had "round" features, including a

circular head, large lips, and noses with bushy eyebrows, while “spiky” faces had pointy chins, narrow eyes, thin eye brows, and spiky facial hair. None had eyeglasses or other facial enhancements. Stimulus names consisted of 6 exemplars, three “round” (Jono, George, and Lou) and three “spiky” (Pete, Kirk, and Mickey). As an initial test for the social bouba/kiki effect names used in this study and the next were chosen and classified by the experimenter depending on whether they consisted of mainly back vowels or front vowels and on whether the lips were spread or rounded when articulating the name. Following these first two studies, only names which had been standardised and validated through the methodological process described in Chapter 2 were used[9].

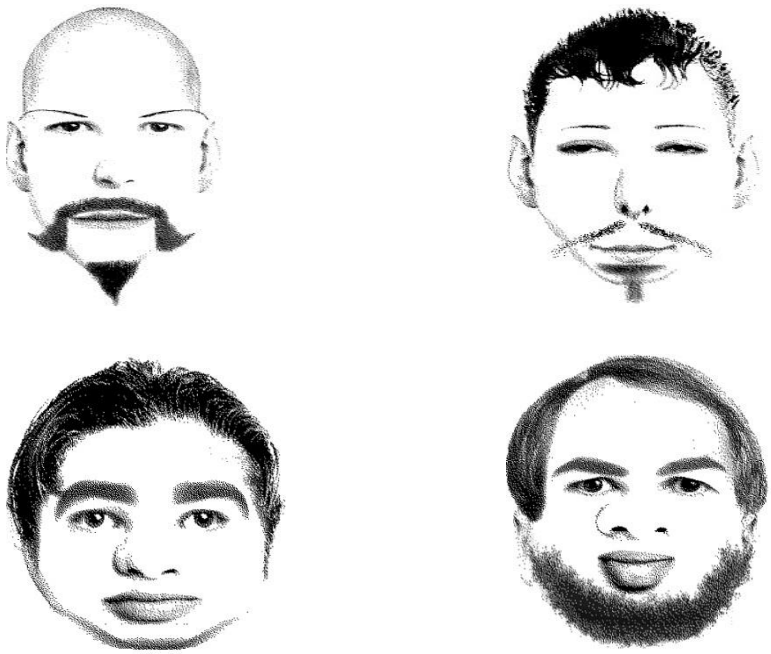


Figure 8. Examples of spiky (top row) and round (bottom row) stimulus faces.

Procedure

[9] Study 1a and 1b were essentially pre-tests which used a predominantly subjective approach to choosing or designing stimuli. Stimuli were later objectively validated in “Chapter 2: Methodological considerations”. Subsequent studies, from Chapter 4 onwards used these standardised stimuli for future testing. Indeed, in later experiments (from Chapter 4 onwards) the names Jono, Lou, Pete, Kirk, and Mickey were completely dropped from the stimulus set.

Participants were tested in individual light and sound- attenuated experimental cubicles containing 21-inch iMac computer workstations running custom-made Superlab software (SuperLab, 2006). The software was used to present all instructions and stimuli and to collect participants' responses. After giving informed consent, participants were given the following instructions:

> This is a short survey about face perception. You will be presented with 20 faces. Please rank each face on the scales according to the questions asked. You might find it useful to speak the names out aloud when making your decision.

Following these instructions, participants completed 20 randomised trials, in which a face appeared on the left side of the screen with the six possible stimulus names below it in random order (Figure 9). Participants used their mouse to drag on the names to rank order them, then clicked "Next" to advance to the next face.

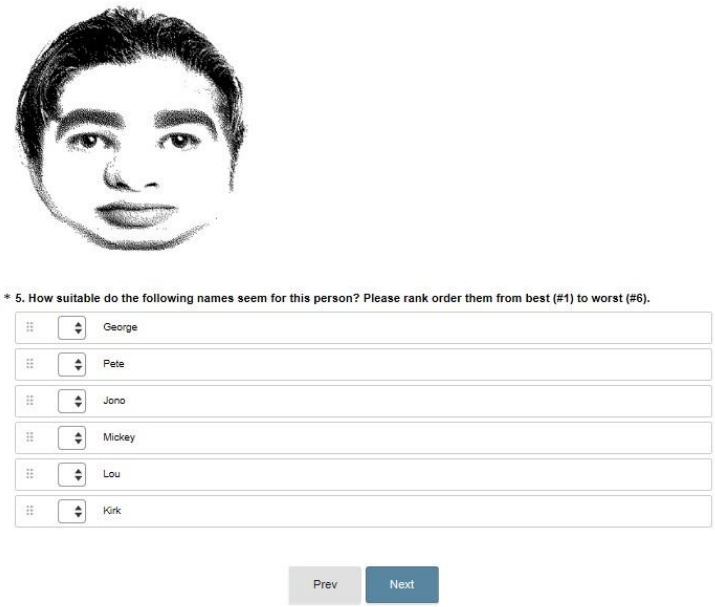


Figure 9. Sample naming trial with a round face.

After ranking names for 20 faces, participants were asked to look at each face again and rate it according to how round or pointy[10] they thought it was. The instructions were simply, “Please rate this face on how round or pointy you think it is.” Figure 10 is an example of a trial used in Study 1a. Once again, the 20 faces were presented randomly on the left side of the screen, with a 10- point radio button scale appearing below the face. Ratings were made on a 10- point scale anchored at 1 (“Very round”) and 10 (“Very pointy”). After rating all the faces, participants completed an additional, unrelated procedure before answering some demographic questions and receiving a full debriefing.

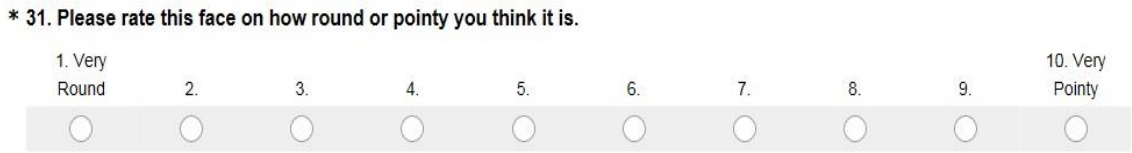


Figure 10. An example of a face-rating trial in Study 1a.

Results

Manipulation Check

[10] My initial experiments employed the term “pointy” which was subsequently changed to “spiky” in later experiments.

Face roundedness ratings were compared using an independent samples *t*-test, which confirmed that "round" faces were judged as being significantly more rounded (M = 1.98, SD = .43) than ""pointy" faces (M = 7.56, SD = 1.15), $t(18) = -14.41$, $p < .001$.

Name Ranking Analysis

An average name ranking for round and pointy faces was computed and analysed for each participant. The means ranks of congruent names (i.e., the rank of round names for round faces, and the rank of pointy names for pointy faces) and their standard deviations are shown in Table 3.

Table 3

Name-face rankings for shape-congruent names for round and pointy faces. The table shows mean face shape rankings, standard deviations, std. error of the mean and participant numbers(N).

Face Type	N	Congruent Name Rank	Std. Deviation	Std. Error Mean
Round	56	3.33	.29	.04
Pointy	56	3.34	.41	.06

One sample *t*-tests were conducted to determine whether congruent name rankings were significantly higher (closer to 1) than chance (3.5) for round and pointy faces separately. Both tests were significant, round $t(55) = -4.45$, $p < .001$; pointy $t(55) = -2.91$, $p = .005$. A paired samples t-test comparing congruent name rankings between round and pointy faces was not significant, $t(55) = -.22$, $p = .825$. Round faces were as equally likely to be named congruently as were pointy faces, hence the effect generalised across both face types.

Gender differences in congruent- naming

Mean congruent-name rankings were calculated across gender and can be seen in Table 4. To determine if males and females name-ranked faces differently for round and spiky faces, independent sample t-tests were undertaken. Results showed that for round faces, there were no differences in congruent-name ranking between males and females, $t(55)$ =

0.57, p = .57, and likewise for spiky faces, $t(55) = -0.50$, p = .62. As there were no significant gender differences in name raking, no further gender differences were considered in future studies.

Table 4

Gender congruent-naming differences with number of participants, mean congruent ratings (SD), and standard error of the mean.

Gender	Face Shape	N	Mean	Std. Deviation	Std. Error Mean
Male	round	15	3.36	0.28	0.07
Female	round	42	3.31	0.30	0.05
Male	pointy	15	3.29	0.41	0.11
Female	pointy	42	3.35	0.41	0.06

Proportion of faces named congruently

To demonstrate the magnitude of the effect, we also examined the data by treating faces as the unit of analysis. A face was classified as “congruently-named” if the average rank of congruent names was closer to 1 than the average rank of incongruent names. This analysis revealed that for round faces, 90% of the faces were congruently named (closer to 1), and for spiky faces 70% were congruently named (closer to 1) (Figure 11).

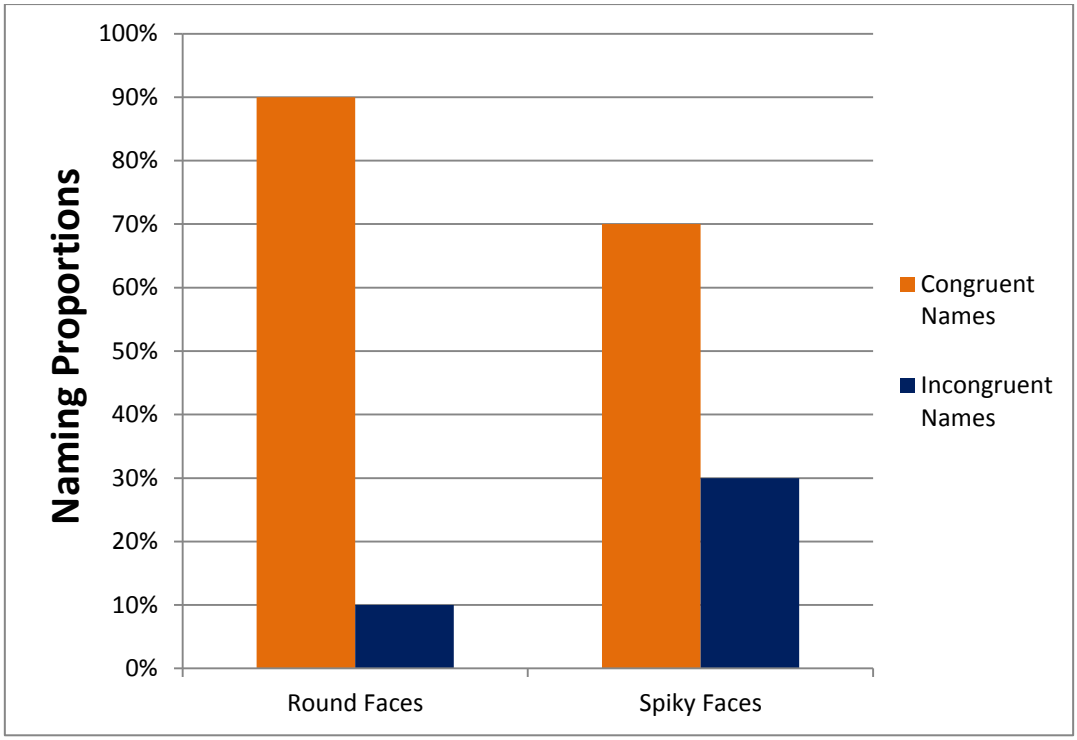


Figure 11. Proportion of faces named congruently versus incongruently.

Discussion

As predicted, round and spiky names were judged as more appropriate for round and spiky faces, respectively, thus demonstrating for the first time a human face version of the bouba-kiki effect. There was no difference in the congruency bias between round and spiky faces; either shape was equally likely to receive a congruent name.

An obvious qualification to the results is that the faces were caricatures and not real faces; indeed, the caricatures had proportions that were not possible for humans. Even if they had been more realistic, the way people name caricatures may not necessarily generalise to the way they name real faces (Tversky & Baratz, 1985). On the other hand, the manner by which names are associated to shapes appears to be consistent across several domains (Bremner et al., 2013; D'Onofrio, 2014; Holland & Wertheimer, 1964; Kohler, 1947; Ramachandran & Hubbard, 2001), so there is no reason to expect a qualitatively different

effect if the same study were run using real faces. Nevertheless, I conducted a second, replication study using real faces.

Further improvements to Study 1 may include adding more facial stimuli as there were only 20 faces used and a small selection of only six names, raising the possibility that, by chance, some of the names happened to be suitable matches for some of the faces, for reasons other than their shape congruence. The faces were also evaluated as round and spiky only after the fact, and side by side which may have highlighted their differences. These improvements were implemented in Study 1b.

Study 1b: Naming Real Faces

The aim of Study 1b was to explore the naming effect further using real faces and to improve on Study 1a's methodology. Unlike in that study, the faces used in Study 1b were classified *a priori* as round and spiky by pre-test participants, as described in Chapter 2. As in Study 1a, it was hypothesised that participants would judge round and spiky names as more suitable for round and spiky faces, respectively.

Method

Participants

Sixty-seven participants completed this study. All participants were paid NZ$15 for their participation. There were 21 Males (*M* age = 21.60 years, *SD* = 2.60) and 46 females (*M* age = 22.10 years, *SD* = 3.80). The majority of the participants identified as New Zealand European/European (73%), followed by Asian (25%) and the remaining as "Other". All participants were fluent in English. Informed consent was obtained from each participant at the start of the study.

Stimuli

The study used 32 stimulus faces drawn from the stimulus pool described in Chapter 2. The photographs were colour head shots of Caucasian males, standardised on a height dimension of 335 pixels (width kept proportionate to height). There were 16 round and 16 spiky faces in the set. Ten names were chosen using similar criteria described in study 1a, five round (Paul, Joe, Lou, George, and Bob) and five spiky (Rick, Mike, Kirk, Vic, and Pete).

Procedure

This study, which was conducted in conjunction with an unrelated experiment, was run in groups of up to ten participants working at individual computer workstations, separated by partitions, in a large testing room. Participants were given the following onscreen instructions:

> This is a short survey about face perception. You will be presented with 32 faces and will be asked to complete two tasks. In the first task, you will be asked to rank order the names from 1 to 10. Please rank the best name for the face as 1, second best 2, and so on, with the worst name for the face ranked as 10. After you select the first name you will notice the program places numbers beside the other names. You should change these numbers to reflect your choices. In the second task you will be asked to rate the faces on a scale from 1 to 10, based on how round or angular the face appears to you. You might find it useful to speak the names out aloud when making your decision.

The procedure was identical to Study 1a, with the exception that Study 1b had 32 naming trails and 32 face rating trials. Figure 12 is an example of a typical naming trial from the Study 1b.

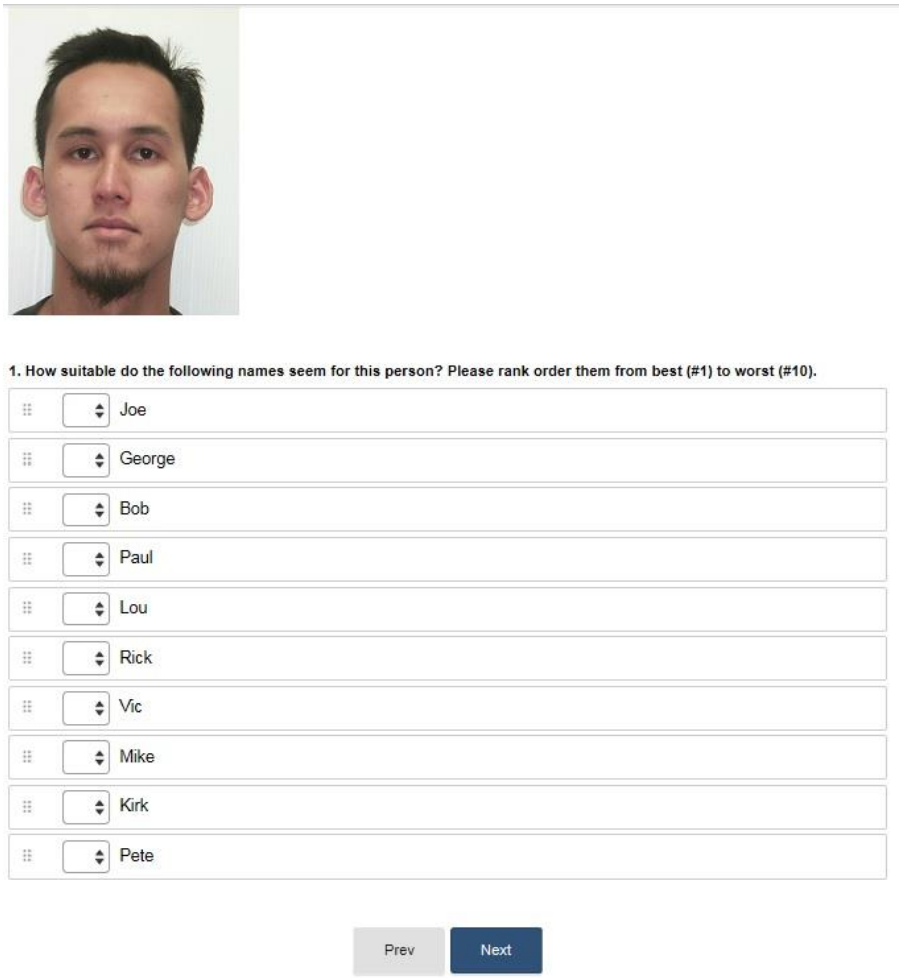


Figure 12. Screen shot of a naming trial in Study 1b.

Results

Manipulation Check

Roundedness ratings were compared using an independent samples *t*-test, which confirmed that "round" faces were being judged as significantly more rounded (M=2.51, SD=.58) than "spiky" faces (M=6.27, SD=.74), $t(30) = -16.04$, $p < .001$.

Name ranking

An average ranking was calculated for each participant using the same procedure as in Study 1a. However, in Study 1b the average rank was compared to a chance ranking of 5.5

because there were 10 names to rank as opposed to 6 in the previous study. Table 5 show the means and standard deviations for name rankings for both round and spiky faces.

Table 5

Means, standard deviations, number of participants (N) and the standard error of the mean for round and spiky faces.

Face Type	N	Congruent Name Rank	Std. Deviation	Std. Error Mean
Round	67	5.12	.44	.05
Spiky	67	5.14	.37	.05

One sample *t*-tests were conducted to determine whether congruent names were ranked significantly higher than chance (5.5), for round and spiky faces separately. Both tests were significant, round t (66) = -7.04, $p < .001$, spiky t (66) = -8.03, $p < .001$. A paired samples t-test comparing congruent name rankings between round and spiky faces was not significant, $t(66) = -0.35$, $p = .724$. Round faces were no more likely to be named congruently than were spiky faces, hence the effect generalised across both face types.

Proportion of faces named congruently

As in Study 1a, I also examined the data with faces as the unit of analysis, classifying a face as "congruently named" if the average rank for congruent names was higher than the average rank of incongruent names. The analysis showed that 87.5% of round faces and 93.75% of spiky faces were named congruently (Figure 13).

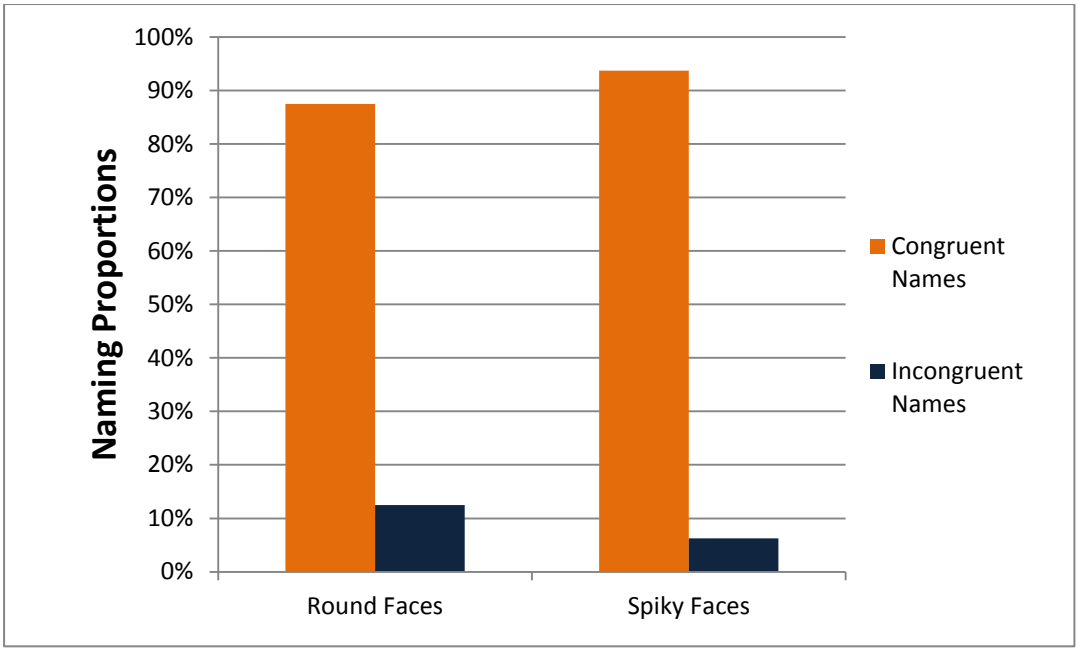


Figure 13. Proportion of faces named congruently versus incongruently.

Discussion

The results supported the hypothesis that participants would judge shape-congruent names as more suitable than shape-incongruent names, thus corroborating the results of Study 1a, and establishing a "social" version of the Bouba-Kiki effect.

There were a few improvements to Study 1a worth noting. One major improvement was the use of real faces instead of caricatures. Researchers have suggested that the effects found using caricatures may not necessarily generalise to real faces (Tversky & Baratz, 1985), but in this case the effect was robust across both caricatures and real faces. The faces used in Study 1b were also rated as round and spiky using a more robust quantitative method described in Chapter 2 and the use of a larger pool of names further improved confidence in the conclusions.

General Discussion

The bouba-kiki effect is the tendency to associate stimuli which are related by sound symbolism (Kohler, 1947; Ozturk et al., 2013; Ramachandran & Hubbard, 2001). For example the round name “bouba” is associated more with round shapes while the spiky word “kiki” with more angular shapes. The current studies are the first to show an analogous effect with human faces: “round” names like “Bob” were judged as more suitable for people (and caricatures of people) with rounded heads than for people with “spiky” heads. The present results also add to previous research, in which (for reasons unknown at the time) some names were judged a better fit to certain faces (Lea et al., 2007). The current studies add to this research by suggesting a reason certain names and faces are more associated is due to the sound symbolic relationship between the name and face.

Although both Studies 1a and 1b used a limited number of stimuli (as in all previous research in the area e.g., (Nielsen & Rendall, 2011) , there is no reason to suspect that the results are an artefact of the particular names and faces used. Nevertheless, it is possible that the names used are statistically associated with similar faces in the real world. For example there may be a disproportionate number of males named “Mike” who have spiky faces (perhaps itself a consequence of the social bouba-kiki effect). Also there are several factors associated with real names which could influence judgements. For instance, research shows that there are names which are considered as more likely to be associated with criminals (Kalist & Lee, 2009), with school truancy and misbehaviour (Figlio, 2007), with attractiveness (Greitemeyer & Kunz, 2013), and with ethnicity which leads to discrimination (Banaji, Hardin, & Rothman, 1993; Banaji & Hardin, 1996; Cotton, O'neill, & Griffin, 2008). Hence, there may be intrinsic factors associated with specific names which make them more likely to be used stereotypically. Consequently, further research, with a broader selection of names is necessary to establish the validity and generality of the bouba-kiki effect in faces.

Although the current studies were only designed to test for the existence of a bouba-kiki effect in human faces, and not to test competing accounts of the effect, there are several possibilities. One theory suggests that the effect may arise from cortical connections in the brain which connect corresponding areas associated with the visual perception of shape, observing the shape of the lips when the speaker sounds the word and feeling the tongue's inflection and movement in the mouth when saying or mimicking the word (Ramachandran & Hubbard, 2001). For instance a participant sees a round face on screen and says the first name (either audibly or silently) on the list which happens to be "Bob", thus rounding his lips as he says the name. The participant consequently feels the inflection of his tongue in his own mouth, at the same time associating the roundness of his lips to the round shape of the face.

Another explanation for the effect may be due to the fundamental frequencies produced when articulating the names. Research in this area shows that low back vowels such as |o| and |u| are consistently matched to larger objects compared to high back vowels |i| and |e| which are matched to smaller objects (Sapir, 1929). Tonal frequencies of vowels have similarly been found to be linked to the size of objects (Whalen & Levitt, 1995). In the real world, thinner or smaller objects tend to produce higher pitch while wider, larger objects produce lower pitch. It may be the case that the rounded faces appear wider and larger compared to spiky faces. Hence the name "Bob", which has the /o/ vowel produces a name with a lower tone which more resembles the shape of a larger rounded face. "Rick" on the other hand, contains the /e/ vowel which produces a name with a higher fundamental frequency which resembles a thinner and smaller face. Hence, we find that fundamental frequency of names may be a factor which strongly influences the way people associate names to faces.

Like the naming of objects, naming of people may not be as arbitrary as many linguists believe (De Saussure, 2011). Given a choice, people tend to choose names which are

congruent with a person's face shape. But while perceivers believe people *should* have names that match their faces, actual name-face congruence, of course varies such that some people will have "better" names than others. What are the evaluative consequences of having an ill-fitting name? This is the question taken up in the next chapter.

Chapter 4: Name-face congruency and positivity

In Chapter 3, I found that like shapes, faces are also named non-arbitrarily. As in bouba-kiki research, rounded faces were mapped to rounded names and spiky faces to spikier names at a level greater than chance. The same effect was found to exist for caricatures and real faces.

Hence, people may expect others to have names that fit their faces. But what if they do not? A large literature on congruency, reviewed in part earlier in the thesis, suggests that people with misfitting names may suffer negative consequences. In general, mismatching or unexpected pairings tend to be disliked. For example, products that have incongruent labels, design, or packaging are less likely to succeed in the marketplace (Spence, 2011). In one study, shoppers were more favourable when the ambient scent in the store was congruent with the gender-based products sold in the store, compared to when the ambient scent was incongruent (Spangenberg et al., 2006). Similarly, other studies have shown the effects of olfactory congruency, that congruent odours enhance product evaluations (Bone & Jantrania, 1992), facilitate information processing, and alter choice behaviour (Mitchell et al., 1995).

In this Chapter, I present two studies to test the hypothesis that congruently- named faces are judged more positively than incongruently- named faces. In the first study (Study 2a), I examine if faces named congruently are liked better than faces named incongruently. The second study replicates the first, and extends the analysis to other positive traits.

Study 2a: The relationship between naming and liking

The aim of Study 2a was to determine if people like congruently-named faces more than incongruently- named faces. The method was similar to that used in Study 1b, except that, after ranking the round and spiky names, participants also rated how much they *liked* the person they named. I included a control condition, in which participants rated their liking for

the target faces without naming them, to determine whether any liking differences were relative or absolute.

There were three hypotheses which were based in part on the findings of Study 1a and Study 1b: Firstly, Study 2a would replicate Study 1b regarding name matching as I expected round names to be ranked as more suitable for round faces than for spiky faces; secondly I expected congruently-named faces to be liked better than incongruently-named faces; thirdly, I expected these faces to be liked better and worse, respectively, than faces in the control condition.

There were a few methodological improvements made in Study 2a over the studies reported in Chapter 3. Firstly, all the names were quantified as round and spiky using the more robust methods described in Chapter 2. This study also used more faces (40), which had been pre-rated as round and spiky.

Method

Participants

A total of 194 participants were recruited for this study via Amazon Mechanical Turk and remunerated US$0.40 for their participation. There were 110 females (*M* age = 33.17 years, *SD* = 10.01), and 83 males (*M* age = 37.35 years, *SD* = 11.36), and 1 person who identified as “other”. The majority of the participants lived in the USA (97%) and spoke English as their first language (96%). All participants were fluent in English. Informed consent was obtained from each participant at the start of the study.

To ensure participants could only complete a study once, we used an intermediate site called “Turketron” (www.turketron.com) which provided important functions like counterbalancing and checking Internet addresses and Mechanical Turk Identification details, so that each participant could be logged. This preventing them completing the study more

than one. This process of managing participants was employed in all studies reported in this thesis which recruited participants via Mechanical Turk.

Stimuli

A total of 40 faces were used as stimuli. There were 20 round faces and 20 spiky faces drawn from the pool described in Chapter 2. Each face was associated with 8 names (4 round and 4 spiky), which were randomly chosen from a pool of 35 names (see Appendix A, and Chapter 2 for details of the name rating process). These names were randomly chosen from the pool for each face but once chosen stayed with the face across participants.

Procedure

Participants were randomly assigned to one of two conditions. In the naming condition, participants read the following instructions:

> In the following study we are interested in your impressions of people. You will be presented with 40 faces. We don't know their names, but we have a list of names which might be the actual names of these people. Please help us by choosing suitable names for these people. Names should be ordered from best name (#1) to worst name (#8), so please place the most suitable names at the top of the list and the least suitable names at the bottom.

As in Study 1b, participants used their mouse to drag the names into the order they wished. In addition, they were asked to type their top name choice into a box provided below the list of names, in order to make the name more salient just prior to making a liking rating. Below the naming trials participants were asked to rate how much they liked the individuals they named, using a 9 point scale anchored at 1 ("Very Little") and 9 ("Very Much"). A screen shot of a typical trial appears in Figure 14.

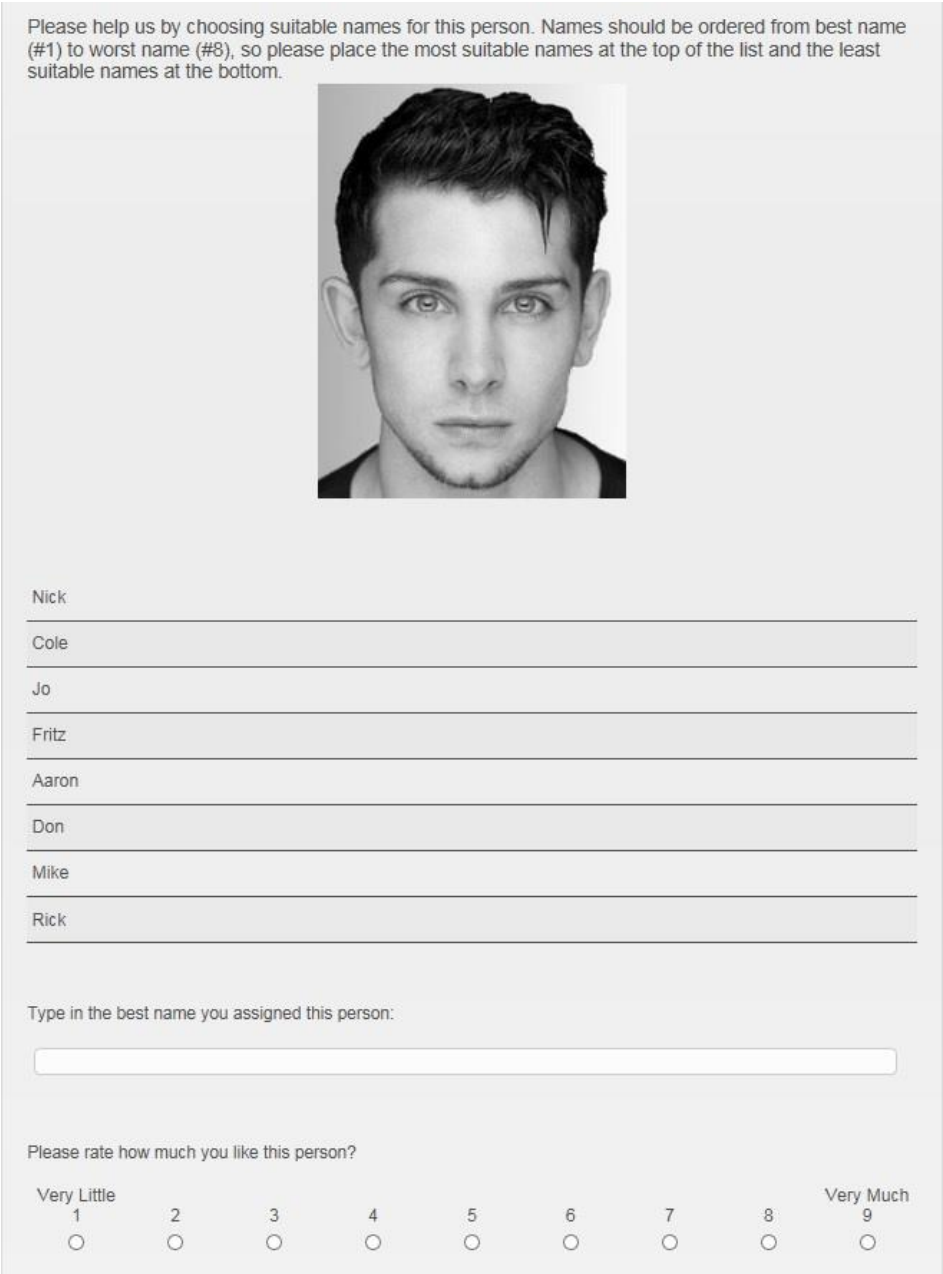


Figure 14. Screen shot of a trial from Study 2a.

The control condition was identical, except that participants did not sort or list names, but only rated the face on how much they liked it. In both conditions, after participants rated their liking for a face, they clicked through to the next trial until they had completed 40 trials. Finally, they completed a short demographics form and were debriefed.

Results

An average name ranking for round and spiky faces (i.e., the rank of round names for round faces, and the rank of spiky names for spiky faces) was computed and analysed for each participant in the naming condition using the same procedure as in Study 1a. However, in this study the average rank was compared to a chance ranking of 4.5 – as there were 8 names to rank. Table 6 shows the number of participants, means, standard deviation, and standard error of the mean for congruent-name rankings for both round and spiky faces in the naming condition.

Table 6

Number of participants (N), means, standard deviations, and standard error of the mean for round and spiky faces in the naming condition.

Face Type	N	Congruent Name Rank	Std. Deviation	Std. Error
Round Faces	96	4.15	.33	.03
Spiky Faces	96	4.12	.30	.03

One sample *t*-tests were conducted to determine whether congruent name rankings were significantly higher (closer to 1) than chance (4.5) for round and spiky faces separately. Both tests were significant; round t (95) = -10.32, $p < .001$; spiky t (95) = -12.49, $p < .001$. A paired samples t-test comparing congruent name rankings between round and spiky faces was not significant, t (95) = 0.84, $p = .403$. Round faces were as equally likely to be named congruently as spiky faces, hence the effect generalised across both face types.

These results replicated the findings from Studies 1a and 1b, which found that round and spiky faces were named congruently at a level greater than chance, and that the effect was not biased towards either face shape.

Liking for congruently and incongruently-named faces

To test for liking differences in the naming condition, faces were first classified as "congruently-named" or "incongruently-named" based on the average ranking of congruent names (e.g., a round face was classified as congruently named if the average rank of round names was lower than 4.5). Liking ratings were analysed in a 2 (round versus spiky face) x 2 (congruently-named versus incongruently-named) repeated measures analysis of variance (ANOVA). Means appear in Table 7.

Table 7

Participants' mean liking ratings (SD) across face shape and match type.

Face Shape	**Match Type**	**Liking Average**	**Std. Deviation**
Round	Congruent	4.88	1.36
Round	Incongruent	4.50	1.51
Spiky	Congruent	5.38	1.31
Spiky	Incongruent	5.17	1.41

There was a main effect for face shape, $F(1, 95) = 63.01$, $p < .001$, *partial* $\eta^2 = .40$, such that spiky faces ($M = 5.27$, $SE = 0.13$, 95% *CI* [5.01, 5.54]) were liked more than round faces ($M = 4.69$, $SE = 0.14$, 95% *CI* [4.41, 4.97]) . There was also a significant main effect for congruence $F(1, 95) = 22.19$, $p < .001$, *partial* $\eta^2 = .19$, such that congruent faces ($M = 5.13$, $SE = 0.13$, 95% *CI* [4.87, 5.40]) were liked more than incongruent faces ($M = 4.83$, $SE = 0.14$, 95% *CI* [4.56, 5.11]). The interaction did not reach significance, $F(1, 95) = 2.87$, $p = .094$, *partial* $\eta^2 = .03$.

Correlational Analysis

A Pearson's correlation was computed between congruence score and liking (the difference (incongruent name rank average – congruent name rank average) between ranking averages for round and spiky names for each face to the average liking ratings for the face).

The correlation between congruency score and liking was positive and significant, $r = 0.366$, $p = .02$. The linear relationship between the two variables is plotted in Figure 15.

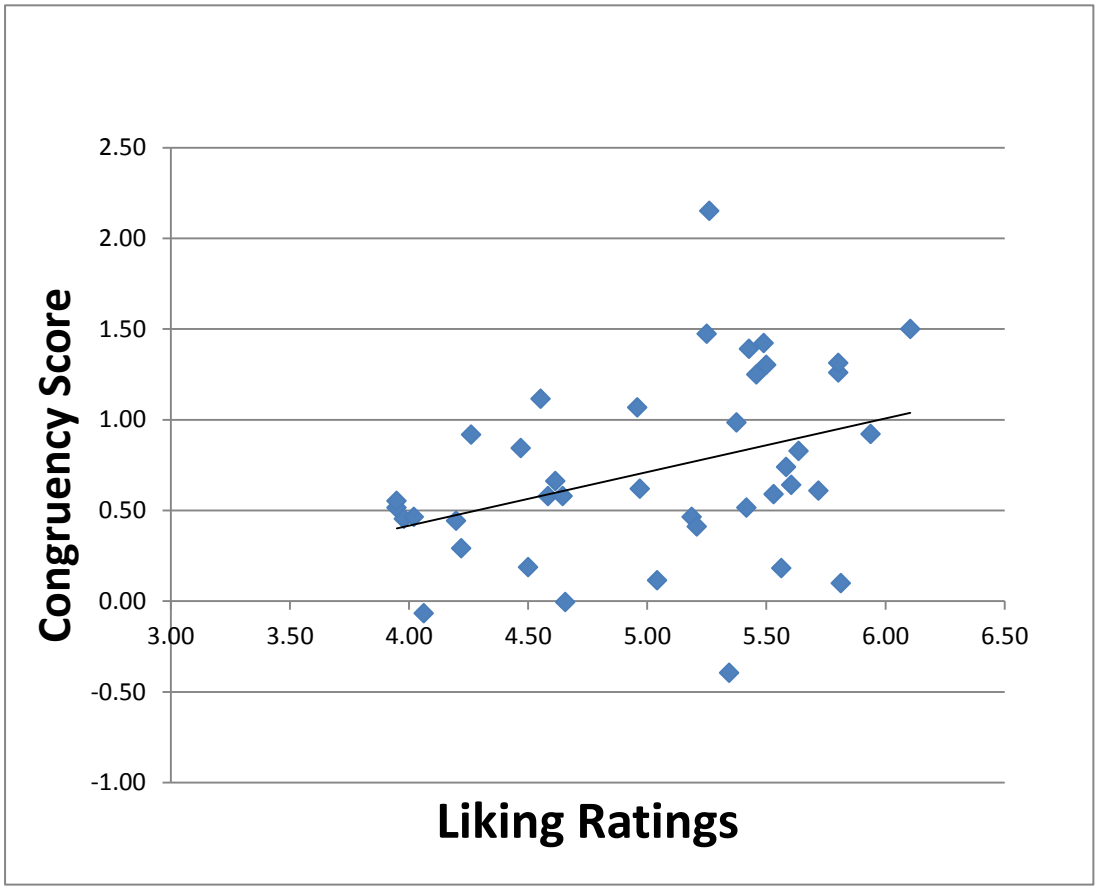


Figure 15. The linear relationship between congruency score and liking.

Face by Face : Analysis of Liking between conditions

Independent samples *t*-tests using participants' liking ratings as the dependent measure were conducted to determine the difference between congruent and incongruent liking ratings for faces in the naming condition and those in the control condition. Results showed a significant difference between liking ratings for round congruent and control faces, $t\ (192) = 6.45$, $p < .001$, and for round incongruent and control faces, $t\ (192) = 4.04$, $p < .001$. A similar result was found between spiky congruent and control faces, $t\ (192) = 4.82$, $p < .001$ and spiky incongruent and control faces $t\ (192) = 3.45$, $p = .001$.

Irrespective of whether the faces were named congruently or incongruently, liking ratings in the naming condition were significantly higher than in the control condition. Means and standard deviations appear in Table 8.

Table 8

Means and Standard Deviations for round and spiky faces in the naming and control conditions.

	Naming Condition		**Control Condition**	
Faces	**Liking Ratings**	**Std. Deviation**	**Liking Ratings**	**Std. Deviation**
Round Congruent	4.88	1.36	3.72	1.16
Round Incongruent	4.50	1.51	3.72	1.16
Spiky Congruent	5.38	1.31	4.54	1.10
Spiky Incongruent	5.17	1.41	4.54	1.10

Discussion

The results showed that, again, participants named faces congruently, replicating the results of Study 1a and 1b. Furthermore, faces that were named congruently were also judged more positively than faces named incongruently, supporting the second hypothesis. Although congruently- named faces were, as predicted, liked better than incongruently- named faces, *both* types of faces were liked better than faces that were not named at all. Although this result was not predicted, it is, in retrospect, understandable in light of other research showing a benefit to naming.

Research suggests that learning the names of individuals “humanises” them, whereas removing people’s names can create anonymity undermining social connectedness (Townes-

O'Brien, Leiman, & Duffy, 2014). Prisons take advantage of this dehumanisation effect by removing prisoners' names and replacing them with numbers, which serves to create distance between individuals and reduce empathy (Erard, 2015). Haque and Waytz (2012) claim a similar practice is becoming prevalent in the medical sector, which encourages doctors to be less sensitive to patients' pain and less empathic towards them. Conversely, naming has the potential to humanise: people consider self-driving cars as safer when they give them names (Waytz, Heafner, & Epley, 2014), and researchers who work with animals believe that animals who have been named receive better care and get better treatment because they are seen as individuals (Erard, 2015). Erard (2015) believes that some researchers refrain from naming animals, because it allows them to maintain an emotional distance from the animals they will later euthanize. Similarly, the ability of names to create identities and social connections may explain why stimulus faces in the naming condition were liked significantly more, independent of whether they had been assigned a congruent or incongruent name.

Study 2b: The relationship between naming and personality

The previous study demonstrated that participants liked faces they named congruently more compared to the faces they named incongruently. The aim of the current study was to replicate the results, and to determine whether the liking effects generalise to other positive traits. The procedure in Study 2b was identical to Study 2a, except that, in addition to judging liking, participants rated the named faces on six positive personality traits: honesty, intelligence, competence, trustworthiness, leadership, and charisma (These particular personality traits have previously been used in a study which investigated if ratings of competence extracted from faces could predict election outcomes) (Todorov, Mandisodza, Goren, & Hall, 2005).

Another important consideration for conducting this study was to test if any particular trait was more or less associated with name-face congruency compared to other traits. The reasons for this is that certain personality traits have been implicated in certain domains as being important predictors which lead to certain outcomes. For instance, competence has been found to be an important trait in predicting political success (Olivola & Todorov, 2010; Todorov et al., 2005). Furthermore, another study found extraversion and agreeableness to be the best predictors of transformational leadership (Bono & Judge, 2004). Conscientiousness, on the other hand, has been found to be one of the most important predictors of academic success and workplace performance (Higgins, Peterson, Pihl, & Lee, 2007; Salgado, 1997). And still another study unexpectedly found that aggression was a strong predictor of grade point average (GPA), because less aggressive children were more likely not to act out in class and devote more time to doing their work (Butcher, 2004). Hence, it may be that name-face congruency does not have globally positive implications, but is associated with particular positive traits.

The hypotheses were, again (1) that participants would judge round names as more suitable for round faces than for spiky faces, and (2) that congruently named faces would be liked more than incongruently named faces. I made no a priori predictions about ratings on other positive traits.

Method

Participants

There were a total of 93 participants who completed this study. All participants were recruited via Amazon Mechanical Turk were paid US$1.5[11] for their participation. There were 46 Males (*M* age = 37.76 years, *SD* = 11.47) and 47 females (*M* age = 36.15, *SD* =

[11] Because this study took longer (+/- 40mins) than others previously conducted online, participants were paid more.

12.24). The majority of the participants lived in the USA (95%) and spoke English as their first language (94.6%). All participants were fluent in English. Informed consent was obtained from each participant at the start of the study.

Stimuli and procedure

The recruitment, format and debriefing procedures for Study 2b were the same as those for Study 2a except that, below the liking ratings, participants rated each face on honesty, intelligence, competence, trustworthiness, leadership and charisma, always in that order. Participants responded on a 9-point scale anchored at 1 (Not at all) to 9 (Very much). A screen shot of a typical trial appears in Figure 16. No control condition was used in this study.

Please help us by choosing suitable names for this person. Names should be ordered from best name (#1) to worst name (#8). Use your mouse to drag the names up and down, so that the most suitable names appear at the top of the list and the least suitable names at the bottom.

Rob
Ike
Zane
Hugo
Vince
Ezra
Bruno
Joe

Type in the best name for this person from the list above

How much do you like this person?

1.Not at all	2	3	4	5	6	7	8	9.Very Much
○	○	○	○	○	○	○	○	○

Please rate this person on the following personality traits

	1.Not at all	2	3	4	5	6	7	8	9.Very Much
Honesty	○	○	○	○	○	○	○	○	○
Intelligence	○	○	○	○	○	○	○	○	○
Competence	○	○	○	○	○	○	○	○	○
Trustworthiness	○	○	○	○	○	○	○	○	○
Leadership	○	○	○	○	○	○	○	○	○
Charisma	○	○	○	○	○	○	○	○	○

Figure 16. Trial screen shot from Study 2b

Results

Name Ranking

An average ranking was calculated for each participant using the same procedure as in Study 1a. However, in this study the average rank was compared to a chance ranking of 4.5. Table 9 shows the means and standard deviations for name rankings for both round and spiky faces.

Table 9

Number of participants, means, standard deviations, and standard error of the means for round and spiky congruently-named faces.

Face Type	N	Congruent Name Rank	Std. Deviation	Std. Error
round	93	4.10	.35	.04
spiky	93	4.08	.30	.03

One sample *t*-tests were conducted to determine whether congruent name rankings were significantly higher (closer to 1) than chance (4.5) for round and spiky faces separately. Both tests were significant; round t (92) = -11.16, $p < .001$; spiky t (92) = -13.38, $p < .001$. A paired samples t-test comparing congruent name rankings between round and spiky faces was not significant, t (92) = 0.48, $p = .633$. Round faces were as equally likely to be named congruently as spiky faces, hence the effect generalised across both face types.

Liking Ratings

Liking ratings (Table 10) were analysed as in Study 2a, in a 2 (Face Shape) x 2 (Congruence) repeated measures ANOVA. Results showed a main effect for face shape, $F(1,92) = 121.51$, $p < .001$, *partial* $\eta^2 = .57$, such that spiky faces ($M = 5.59$, $SE = .11$, 95% *CI* [5.38, 5.79]) were liked more than round faces ($M = 4.76$, $SE = 0.11$, 95% *CI* [4.54, 4.98]). There was also a main effect for congruence, $F(1,92) = 15.09$, $p < .001$, *partial* $\eta^2 = .14$, with

congruently-named faces (*M* = 5.32, *SE* = 0.10, 95% *CI* [5.11, 5.52]) liked more that incongruently-named faces (*M* = 5.03, *SE* = 0.12, 95% *CI* [4.80, 5.26]). There was no interaction between face shape and congruence, $F(1,92) = 0.360$, $p = .550$, *partial* $\eta^2 < .01$.

Table 10

Liking averages for congruently-named and incongruently-named faces.

Face Shape	Match Type	Mean	Std. Deviation
Round	Congruent	4.93	1.08
Round	Incongruent	4.60	1.30
Spiky	Congruent	5.71	1.05
Spiky	Incongruent	5.47	1.21

Personality Ratings

Personality ratings were analysed in a 2 (Face Shape) x 2(Congruence) x 6 (Personality Trait) repeated measures ANOVA. Table 11 shows the means and standard deviations for each trait divided by face type and congruence.

Table 11

Means and standard deviations for 6 personality traits based on face shape and match type.

Face	Honesty		Intelligence		Competence		Trustworthiness		Leadership		Charisma	
	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev
Round Congruent	4.92	1.08	5.14	1.11	4.89	1.17	5.02	1.13	4.84	1.15	4.75	1.26
Round Incongruent	4.67	1.33	4.85	1.39	4.62	1.35	4.75	1.42	4.30	1.41	4.40	1.46
Spiky Congruent	5.48	1.10	5.86	1.15	5.50	1.16	5.87	1.10	5.61	1.12	5.93	1.18
Spiky Incongruent	5.30	1.33	5.59	1.28	5.35	1.40	5.64	1.26	5.24	1.25	5.69	1.38

Results showed a main effect for Face Shape, $F(1,92) = 121.51$, $p < .001$, *partial* $\eta^2 = .57$. Spikier faces (*M* = 5.59, *SE* = 0.11, 95% *CI* [4.54, 4.98]) were rated higher on the traits than round faces (*M* = 4.76, *SE* = 0.11, 95% *CI* [5.38, 5.8]). There was also a main effect for congruence, $F(1,92) = 15.09$, $p < .001$, *partial* $\eta^2 = .14$; congruent faces (*M* =

5.32, *SE* = 0.10, 95% *CI* [5.11, 5.52]) were rated higher on the traits than incongruent faces (*M* = 5.03, *SE* = 0.11, 95% *CI* [4.8, 5.26]). Other than a main effect of trait type, F (5, 88) = 10.73, $p < .001$, *partial* $\eta^2 = .38$, there was only one other effect, a significant interaction between congruence and trait type, F (5, 88) = 3.58, $p = .005$, *partial* $\eta^2 = .17$. Paired *t*-tests were conducted to probe the nature of the interaction (see Table 12). Congruently- named faces were rated significantly higher than incongruently- named faces on all traits.

Table 12

Congruent and incongruent mean ratings, standard deviations (SD), p-values for t-tests and degrees of freedom (df) for each personality trait.

Personality Type	**Congruent Rating**	**SD**	**Incongruent Rating**	**SD**	**t-test**	**df**
Honesty	5.20	1.12	4.98	1.36	< 0.01	185
Intelligence	5.50	1.18	5.22	1.39	< 0.01	185
Competence	5.19	1.21	4.98	1.42	0.01	185
Trustworthiness	5.45	1.19	5.19	1.41	< 0.01	185
Leadership	5.22	1.20	4.77	1.41	< 0.01	185
Charisma	5.34	1.36	5.04	1.56	< 0.01	185

Discussion

Replicating studies 1a,1b and 2a, the current study showed that participants once again judged round names to be more suitable to round than to spiky faces and, as in Study 2a also liked faces better when they were named- congruently versus named-incongruently. With the exception of trait judgements for ‘honesty ‘and ‘competence’ in spiky faces, congruently named faces were rated more positively on all tested personality traits than incongruently named faces. However, the consistency across traits may have been a limitation of the method used, because personality ratings were simultaneously collected in a single trial rather than separating them across several trials. After making one rating participants may have simply remained consistent with further ratings. An improvement

would have been to separate ratings individually across several trials and randomising the trials.

Unlike what Todorov et al. (2005) found regarding competence and its strong predictive power in predicting election outcomes, no single trait was found to be more predictive of name-face congruency above the others. However, only a limited number of traits were tested in this study, hence it may be possible that there are other traits which were not tested here, which might be more associated with name-face congruency (for example, the big five personality factors (Goldberg, 1990).

The "halo effect" may provide a suitable account for why congruently-named faces were also liked more, and rated more positively on personality factors. Studies in person perception suggest that when a person judges someone positively on one specific trait, they are more inclined to judge them positively on associated traits (Nisbett & Wilson, 1977; Thorndike, 1920). The effects of the halo could cause other traits to be indorsed in the absence of relevant evidence. For instance, if a person were asked to evaluate someone on their level of generosity, they may automatically evoke other judgements on the person's level of warmth, friendliness, or virtue (Kahneman, 2003). Hence, the effect of the halo regarding name-face congruency would be to rate people with good name-face congruency as more positive on other trait dimensions as well, because the positive affect generated through name face congruency would automatically evoke other positive ratings about the individual. Furthermore, the traits associated with congruency, which were tested in this Study 2b, are important, although it is not clear the extent to which they would vary in real-world contexts. In principle, though, the social benefits of congruent names could be substantial, particularly in some domains, like politics or hiring decisions, where success is decided on very small margins (Friedman, 2015). I explore one of these domains in Chapter 6.

General Discussion

Results from Study 2a and 2b replicated the findings of the studies reported in Chapter 3: In both, participants judged names to be more fitting for faces when they were congruent in “shape”, a social version of the bouba-kiki effect. Additionally, the new studies show that congruency is associated with positivity. People liked the faces that they named congruently better than the ones that they named incongruently. This makes sense in terms of the literature on processing fluency, which suggests that stimuli that are processed faster and with more ease are judged more positively (Reber et al., 2004). In the context of the bouba-kiki literature specifically, Kovic et al. (2010) found that participants were faster at pairing rounded shapes with the nonsense round word ‘mot’ and angular shapes with the spiky word ‘riff’. Although the experimenters never explicitly asked participants how much they liked the objects named “mot” or “riff”, perceptual fluency would suggest that they would have judged the congruent pairings more positively than the incongruent pairings due to increased fluency in the congruent pairs.

There is good reason to think that congruency plays a pivotal role in positivity. Many studies have shown that when congruent factors co-occur, positivity results. These effects have be seen in how congruent body positions lead to more liking (Maurer & Tindall, 1983; Trout & Rosenfeld, 1980), how congruent emotional facial expressions and voice expressions lead to more attention (Walker-Andrews & Grolnick, 1983), how gender congruent ambient odours lead to more approach behaviours from customers (Spangenberg et al., 2006), and how viewing a target in the presence of a gender congruent scent leads to more favourable ratings (Mitchell et al., 1995).

However, because congruency in these studies was measured and not manipulated, the direction of causality is unclear. People may like individuals because they have congruent names or, alternatively, may favour congruent names for people they like (for

other reasons).The two effects are not mutually exclusive, but assessing the latter requires further research which is the subject of Chapters 5 and 6.

Chapter 5: The effects of congruency on liking

In the previous Chapter, I found that faces who were named congruently were also rated higher on liking and positive personality variables, compared to faces that had been named incongruently. It is clear, then, that people like others *when* their faces match their names. It is not clear, however, whether people like others *because* their faces match their names. Because the congruency of the name-face pairings was not controlled – participants themselves determined the most appropriate names for each face – the results are also consistent with the reverse causality: participants may have assumed that targets had congruent names because they liked them. The former idea (that congruent naming leads to greater liking) is explored in this Chapter, the latter idea (that liking an individual leads to greater congruent naming) in Chapter 6.

Two studies are reported here, each using a different technique to manipulate name-face congruency. In the first study (Study 3), participants were asked to name round and spiky faces with congruent or incongruent names, similar to Study 2a. However, in this case, they were constrained to choose from *only* sets of round or spiky names, ensuring that they selected a particular name type. In Study 4, names were randomly assigned to faces, using a different, more sensitive repeated measure of liking. In both studies, the hypothesis was that liking ratings would increase more for congruently named faces compared to those incongruently named.

Study 3: Congruency causes liking I

As a first attempt to manipulate name-face congruency, participants were presented round and spiky faces with round *or* spiky names from which to choose, thereby ensuring that the each face was paired with either a congruent-name or an incongruent -name. It was

expected that congruently-named faces would to be liked more than incongruently-named faces.

Method

Participants

A total of 553 participants volunteered for this Study. All participants were recruited through Amazon Mechanical Turk and remunerated US$0.45 for their participation. There were 289 males (*M* age = 39.23 years, *SD* = 13.4) and 263 females (*M* age = 35.35 years, *SD* = 11.2); one person identified as "other". The majority of the participants lived in the USA (93.4%) and spoke English as their first language (97.4%). All participants were fluent in English. Informed consent was obtained from each participant at the start of the study.

Stimuli

Sixty faces (30 round and 30 spiky) and 16 names (8 round and 8 spiky) were selected from the stimulus pools described in Chapter 2. Round names were Bob, Rob, Tom, Don, Joe, Hugo, Otto, and Ron; spiky names were Jake, Nick, Rick, Vic, Levi, Alex, Ike, and Zeke.

Three independent stimulus sets were created, each consisting of ten round and ten spiky faces, randomly chosen without replacement. Half of the round faces in each set were randomly paired with the round name set as response options, and the other half with the spiky name set; the same procedure was implemented for the spiky faces. Participants judged the suitability of the assigned names for all faces from one of the three stimulus sets, randomly determined.

Procedure

The design of Study 3 was the same as Study 2a except that, in this Study, participants rated only 20 faces and were constrained by the choice of only round or spiky names. Participants responded on a 9-point scale anchored at 1 (Very Little) and 9 (Very much). A screen shot of a typical procedure appears in Figure 17.

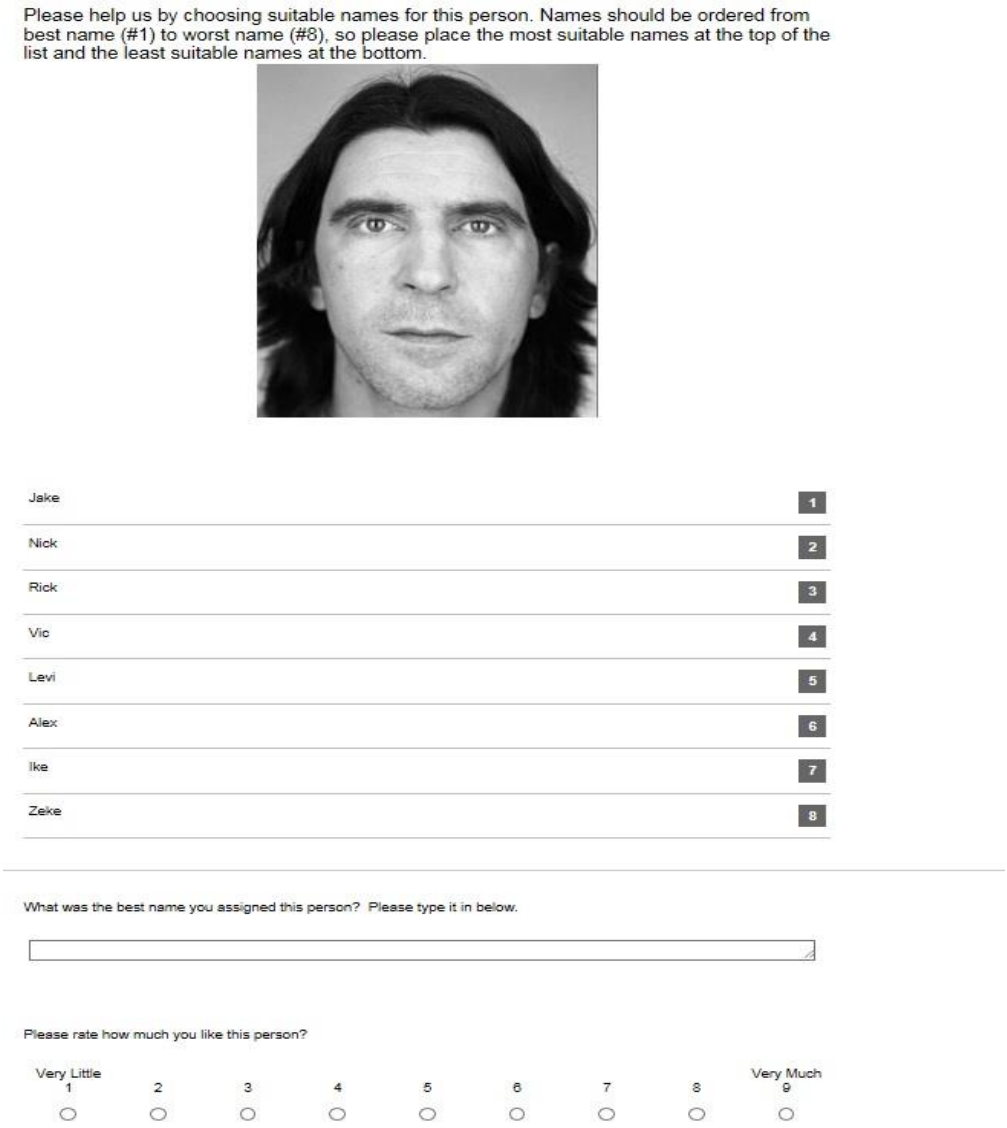


Figure 17: Screenshot of an experimental trial in Study 3.

Results

Liking ratings were calculated for each participant for congruently-named faces (i.e., round faces paired with round names, and spiky face paired with spiky names) and,

separately, for incongruently-names faces (i.e., round faces with spiky names and spiky faces with round names). The means and standard deviations are shown in Table 13.

Table 13

Liking means and standard deviations by face shape and match type.

Face Type	**Match Type**	**Liking Averages**	**Std. Deviation**
Round	Congruent	4.71	1.38
Round	Incongruent	4.64	1.32
Spiky	Congruent	5.15	1.25
Spiky	Incongruent	5.20	1.27

Liking ratings were analysed in a 2 (face shape) x 2 (congruence) x 3 (stimulus set) mixed model ANOVA, with the first two factors treated as repeated measures, which revealed a main effect of face shape, F (1, 550) = 202.47, $p <$ .001, *partial* η^2= .27. Liking for Spiky faces (M = 5.18, SD = 1.26) was significantly higher than for round faces (M = 4.68, SD = 1.35). There was a significant interaction between congruence and face shape, F (1, 550) = 4.22, p = .041, *partial* η^2 = .01, apparently due to the fact that congruently named round faces were liked better than incongruently named round faces, but the reverse was true for spiky faces. Paired samples t-tests, however, revealed that neither difference was statistically significant, round t (552) = 1.46, p = .144; spiky t (552) = -1.23, p = .221. There were no other significant effects.

Discussion

The hypothesis for this study was that congruently-named faces would be liked more than incongruently-named faces. The results showed that participants showed no overall bias towards faces which had been named congruently versus incongruently. Participants did, however, show a measurable difference for spiky faces over round faces, independent of naming. This main effect is consistent with recent research, which has also found that round

faces are generally rated as less likeable, more aggressive, and less attractive that spikier faces (Haselhuhn, Ormiston, & Wong, 2015). This issue also highlights one of the difficulties with interpreting the results from this study, in that there are potentially many influences on liking and the current paradigm may not be sensitive enough to detect any differences due to naming.

Usually when people have their expectations met it usually results in an increase in positivity (Chandrashekar et al., 2009; Michie et al., 1997; Williams et al., 1995; Yeomans et al., 2008). The results from Study 1b showed that participants chose congruent names for targets significantly more than incongruent names. Possibly they chose these names based on what they expected targets to be actually named. Hence, if participants expected targets to have congruent names, violating these expectations may result in more negative evaluations of the target. This was the basis of the task that participants were asked to complete in this Study 3. I expected that for incongruent trials, participant liking ratings would be lower than for congruent trials, because incongruent trials violated expectations of targets names. The present results showed no difference in liking, which meant participants liked targets the same, irrespective of whether they were congruently or incongruently named. Possibly the task of naming the faces did not violate participant expectations at all. There were a range of names to choose from and the task did not suggest any of the names were the actual names of the target. The effect may have been more pronounced if the target were assigned a name, rather than having a name chosen for them by participants.

Furthermore Study 3 only used a limited number of 8 round and spiky names, and only 20 faces were named by each participant. This would have affected results in two important ways: (1) it reduced the generalisation of the findings to a very limited number of names and faces, and (2) naming of faces may be accounted for by factors other than name-face congruency, which would have created noise that the current study was not sensitive

enough to control. As name–face congruency is only one account for the fit between people's names and their faces, other potential accounts may also be implicated, which have nothing to do with the congruence between a person's name and their face. For example, the handing down of names within families, from one generation to another (such as Robert I, Robert II), would cause a collection of features to co-occur with particular names. This could suggest that name-face prototypes are nothing more than observing family structures in the real world (Lea et al., 2007; Rosch, 1999). Another issue is that it is possible that certain facial features are more statistically associated in the environment with different names. This is evident within ethnicity, with certain names (Muhamad) being correlated with certain facial types (Arabs)(Lea et al., 2007).

Furthermore, if we consider the ecological validity of the study, it does not appear to be representative to situations outside of the lab. Usually when we meet people for the first time, we initially make rapid inferences about them based on very little information (Carney, Colvin, & Hall, 2007; Willis & Todorov, 2006). Later we may discover their names. Very seldom do we get to name people for the first time. Other than when we are born, or choose a pen name or screen name, our names remain fairly constant. In the real world we usually only react to people's names, and they to ours, rather than name them. Hence, the current study is not particularly representative of our daily interactions with our personal names. However, it might provide a rationale for designing a study which more closely resembles the actual social situation experienced when meeting new people in the real world.

In sum, although Study 3 showed no evidence of a hypothesised preference for congruently-named faces, there are several reasons to question the sensitivity of the paradigm. Thus, a new paradigm was developed to improve on Study 3's methodology. In Study 4, participants saw twice as many faces, and names were randomly assigned. Most importantly, a repeated rating procedure was used, such that participants learned of a person's

name *after* rating him, and then had an opportunity to adjust the rating in light of the new information. This was an added advantage of Study 4 because it replicated a fairly common everyday social encounter between people.

Study 4: Congruency causes liking II

The hypothesis was that participants would like faces more when they learned that they had congruent versus incongruent names.

Method

Participants

A total of 201 participants were used in Study 4. All participants were recruited via Amazon Mechanical Turk and remunerated US$0.40 for their participation. There were 107 males (*M* age = 36.27 years, *SD* = 11.75) and 94 females (*M* age = 35.63 years, *SD* = 11.81). The majority of the participants lived in the USA (86%) and Europe (7%). Most of the participants spoke English as a first language (92%). All participants were fluent in English. Informed consent was obtained from each participant at the start of the study.

Stimuli

Forty black and white photographs (20 round and 20 spiky) were selected from the stimulus pool described in Chapter 2. Fifty stimulus names (Appendix B) were selected from the stimulus pool and randomly assigned to faces, without replacement, such that half of the faces were given a congruent name and half an incongruent name (counterbalanced).

Procedure

After giving informed consent, the experimental task was introduced as a study of first impressions. Participants were given the following instructions:

> In this survey we are interested in first impressions. You will be presented with information about 40 individual men. In each case you will first be presented with a man's face. Imagine you are meeting the man for the first time, and rate how much you think you would like him. After you make your liking rating, you will be given an extra piece of information about the man: his first name. You will be asked to indicate whether your liking for him has changed, now that you know his name.

Following these instructions, participants were randomly presented with 40 randomised trials in which they first saw a face in the centre of the screen and were asked "how much do you think you would like this person?" The face was accompanied by a sliding scale below (Figure 18-A) which participants used to make their rating. The sliding scale was anchored at 1 (Not at all) and 9 (Very Much). Participants used their mouse to drag the slider to the desired location on the scale.

Following the first rating, the same face was re-presented with its paired name (either congruent or incongruent), with the slider set to the participant's previous rating. Participants were informed that the slider recorded their previous rating, and were asked to re-rate the person in light of the new information. They used the same slider to indicate how much, if any, the rating had changed, but were also given the option to click through to the next trial if their rating was unchanged (see Figure 18-B).

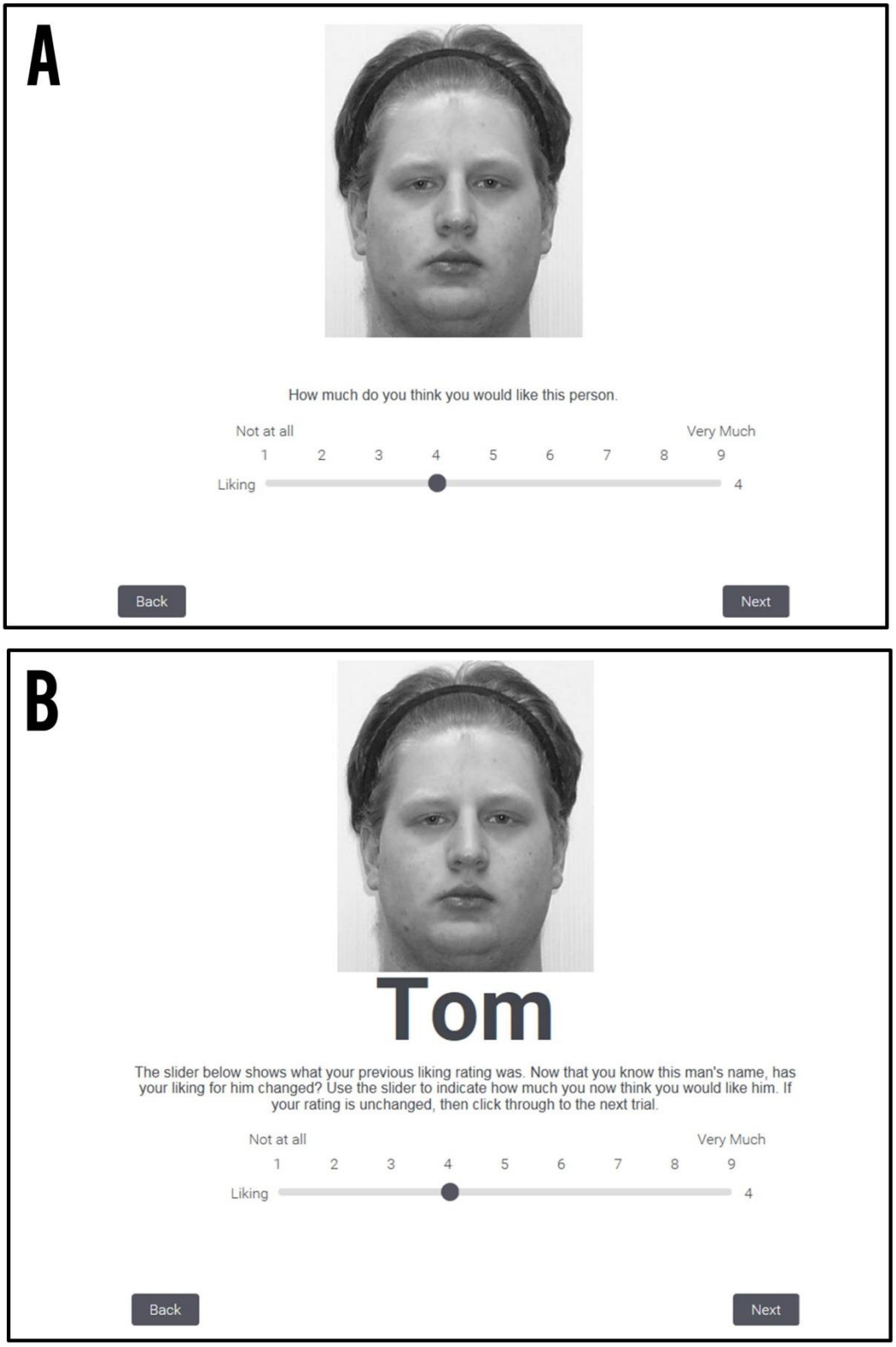


Figure 18. Screenshots of the face rating procedure in Study 4.

Results

Table 14 shows the means and standard deviations for the different liking ratings across the two ratings (pre-naming and post-naming).

Table 14

Means and standard deviations for congruently-named and incongruently-named faces.

	Rating Stage 1 (time 1)		Rating Stage 2 (time 2)	
Face	**Liking Rating**	**Std. Deviation**	**Liking Rating**	**Std. Deviation**
Round Congruent	4.04	1.30	4.14	1.32
Round Incongruent	4.02	1.32	4.06	1.35
Spiky Congruent	4.68	1.26	4.77	1.29
Spiky Incongruent	4.66	1.23	4.62	1.23

Notes: Rating Stage 1 refers to the first liking rating when the face appeared without a name. Rating Stage 2 is the change rating when the face was accompanied by the name.

A 2 (face shape) x 2 (congruence) x 2 (rating stage) repeated measures ANOVA revealed a main effect for rating stage, F (1, 200) = 10.58, p = .001, *partial* η^2 = .05; the liking ratings in the first stage (M = 4.35, 95% *CI* [4.12, 4.52]) were significantly lower than in the second stage (M = 4.40, 95% *CI* [4.23, 4.57]). There was also a main effect for face shape (round vs angular faces), F (1,200) = 182.80, p < .001, *partial* η^2 = .48; Round faces (M = 4.07, 95% CI [3.89, 4.25]) were liked less than spiky faces (M = 4.68, 95% *CI* [4.52, 4.85]). There was no main effect for congruence, F (1,200) = 3.45, p = .065, *partial* η^2 = .02. Overall liking ratings for congruently- named faces (M = 4.41, 95% *CI* [4.24, 4.58]) did not significantly differ from liking ratings for incongruently named faces (M = 4.34, 95% *CI* [4.17, 4.51]).

The key interaction was qualified by a significant three way interaction between rating stage, face-shape, and congruence, F (1, 200) = 4.60, p = .033, *partial* η^2 = .022. To interpret the interaction, separate 2 (congruence) x 2 (rating stage) ANOVAs were conducted for round and spiky faces separately (Figure 19). For round faces, there was a significant interaction between congruence and rating stage, F(1, 200) = 6.04, p = .015, *partial* η^2

=.03. A paired samples *t*-test was conducted to determine if liking for round congruent and incongruent faces between t1 and t2 was significant. For round congruent faces there was a significant difference in liking scores between t1 (M = 4.04, SD = 1.30) and t2 (M = 4.14, SD = 1.32), t (200) = -6.13, p < .001, but for incongruently named round faces the difference between t1 (M = 4.02, SD = 1.31) and t2 (M = 4.06, SD = 1.35) was not significant, t (200) = -1.55, p = .122.

For spiky faces there was a significant interaction between congruence and rating stage, $F(1, 200) = 22.49$, p < 001, *partial* η^2 =.10. A paired samples *t-test* was conducted to determine if the difference in liking between spiky congruent and incongruent faces across t1 and t2 was significant. There was a significant difference for spiky congruent faces between t1 (M = 4.68, SD = 1.26) and t2 (M = 4.77, SD = 1.29), t (200) = -4.55, p < .001, but for spiky incongruent faces the difference between t1 (M = 4.66, SD = 1.23) and t2 (M = 4.62, SD = 1.23) was not significant, t (200) = 1.77, p = .078.

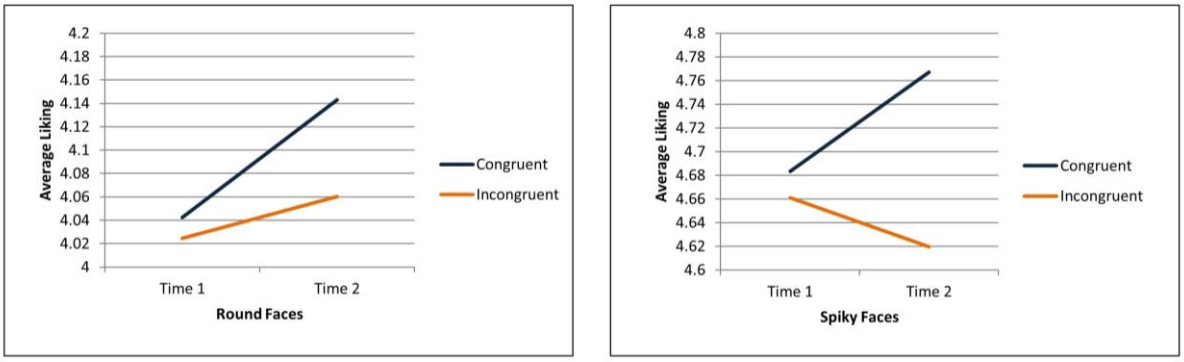


Figure 19. The difference in liking ratings across time 1 and time 2 for face shape and match type.

Discussion

Study 3 suffered from some methodological issues which made it difficult to interpret its null effects, issues which were addressed in Study 4. The improvements in design of Study 4 was sensitive enough to detected predicted effects of naming congruence: liking for faces

increased when participants discovered they had a congruent name while liking for faces with incongruent names remained unchanged or, in the case of spiky faces, actually decreased. Study 4 also replicated Study 3's main effect of face shape, that people with spiky faces were liked more than people with round faces (Haselhuhn et al., 2015), independent of congruence.

One issue worth discussing here relates to demand characteristics: the possibility that participants were able to deduce the experimental hypothesis and change their behaviours accordingly to fit the interpretation (Orne, 2009).The hypothesis for this Study 4 was that participants would like congruently-matched stimuli more than incongruently matched stimuli as determined by the difference in liking ratings between time 1 and time 2. Participants rated faces prior to knowing their names and then again once they discovered what their name was. Hence the most salient aspect of the experiment was a social situation most participants' would have been very familiar with: meeting a new person prior to knowing his or her name and then discovering the person's name post meeting. This fact gave the experiment high ecological validity as it represented an everyday situation most people were accustomed to (Gross, 2012). But for demand characteristics to an influential factor, participants would have had to know that some faces had congruent names and others had incongruent names and then responded to these pairings consistent with the hypothesis. But this seems unlikely, because to do that they would require intimate knowledge of how names had been paired with faces, which only the experimenters knew. Hence the independent and dependent measures were concealed and did not provide clues to the actual research hypothesis. There were no obvious markers participants could have picked up on to know when to increase liking ratings and when to reduce them. Hence it is unlikely that demand characteristics played a pivotal role in explaining the results.

Furthermore, it is worth noting that the effects found in this study were relatively small. The difference in liking between targets with congruent names and those with

incongruent names was minimal. However, this small effect might still make a big difference to someone in the real world. For example, political elections are often decided on very small differences between winners and losers (Friedman, 2015). For politicians, the effect of voters liking them more or less based on their name-face congruency might be minimal, but the effect of this small difference might be significant. Similarly, there are many other examples in the real world where very tiny effects produce significant results, like for example failing an exam based on a single percentage point, or losing a job offer due to a single difference on a personality test.

Finally, it is worth mentioning that this study was potentially high in ecological validity. Often times when people meet for the first time, they do not know the new person's name. Only after gaining a first impression of the person, and forming initial judgements about them will they learn his or her name. In Study 4 people encountered the individual before they discovered his name. I explicitly asked participants to rate how much they liked the person before considering the impact his name made on their liking of him. Granted, people do not usually judge other people's name suitability using this explicit method during their usual daily social encounters, but it does not mean that they do not implicitly employ a similar strategy.

However, meeting someone before knowing their name is only one instance of this type of social encounter. An alternative instantiation is when the name of the person is learnt before the physical aspects of the person becomes known. There are several real world situations which resemble this social contact, for example, making an appointment with a medical practitioner, lawyer, tradesman, or other professional whom you have never met before and called by looking up their names in a phone directory. Another example is going on a blind date with the only information being the person's name, or when you receive an email from a complete stranger and only later put a face to the name when you meet him or

her in person. In all of these situations, the name is learnt prior to discovering what the person looks like. However, even though the order of stimuli presentation is reversed in this case I nonetheless hypothesise that similar results would be achieved. By following an experimental approach which asks people to rate the name prior to discovering the appearance of the name holder a study like this should produce similar results to Study 4.

General Discussion

In Chapter 4, I reported a statistical relationship between congruent naming and liking. Findings showed that people with congruent names were liked more than those with incongruent names, but because participants made their own name-face pairings, it was not clear whether they liked targets because they had congruent names, or chose congruent names because they liked them. In Chapter 5 the former option was tested. The results, at least in Study 4, confirmed that face-name congruency can produce liking.

In Study 3, participants were "forced" to choose only congruent or incongruent name (because only congruent or incongruent names were made available on each trial); no congruency bias was observed, possibly because their expectations were not violated at all. In Study 4, I directly manipulated name-face congruency, and measured liking with a more sensitive within-subjects paradigm. Consistent with the hypothesis, participants liked faces more when they were assigned a congruent-name versus incongruent-name.

To account for the effect that congruency produces greater liking, we can turn to evidence from a wide body of research which supports the idea that congruency leads to increased judgements of positivity. The effect has been noted in several domains which include body posture, mirroring arm and leg positions, matching facial emotions to similar emotional voices, matching gender ambient scents with the gender of a shop's merchandise, and other types of olfactory congruence (Bone & Jantrania, 1992; De Gelder & Vroomen, 2000; Maurer & Tindall, 1983; Maxwell & Cook, 1985; Spangenberg et al., 2006; Walker-

Andrews & Grolnick, 1983). In these examples, congruence led to greater cognitive enrichment and flexibility, whereas incongruence led to more cognitive interference, requiring more cognitive energy to complete a more difficult task. Processing difficulty, in turn, is associated with negative affect.

Tentatively, then, I interpret the results of Study 4 in terms of a causal effect of congruency, in which people benefit when perceivers learn that their name fits their face. This effect, however, does not rule out the reverse causal path, in which liking precedes the inference of name congruence. Likable people may benefit from a version of the halo effect (discussed more about in the next chapter), in which positive physical appearance generalizes across many, sometimes logically unrelated traits. If name congruency is part of that halo, or is otherwise associated with a schema about likeable or attractive people, then manipulating likability should influence the likelihood that an individual's name will be presumed congruent. That is, the social bouba/kiki effect uncovered in Studies 1a and 1b should depend on the valence of the people being rated.

Chapter 6: Liking leads to greater name-face congruency

The aim of this chapter is to examine an alternative causal account of Studies 2a and 2b, such that liking causes or moderates name-face congruency. This idea is supported by research conducted on the halo effect, which shows that people who are rated positively on one characteristic are generally rated positively on others. Thorndike (1920) is credited with the first demonstration of the effect. He asked two commanding officers to evaluate their soldiers on several personal (for example, dependability, loyalty, and responsibility) and physical (for example, neatness, voice, and physique) qualities. He found an unexpectedly large correlation in commanding officers responses. According to Thorndike the correlations were too high and too consistent. He reasoned that ratings on one quality of an officer started a trend which other ratings followed. The effect worked for either positive or negative evaluations; once a single rating was made, further ratings on other qualities followed the same trend.

It is reasonable to expect, then, that we may find the same trend occurring with name-face congruency. If a person is rated positively on a particular social or personal quality, then they might also be named more congruently. This is due to name-face congruency being a positive quality which exemplifies a person who is likeable (de Droog, Buijzen, & Valkenburg, 2012; Maxwell & Cook, 1985; Mitchell et al., 1995; Spangenberg et al., 2006; Walker-Andrews & Grolnick, 1983). The halo effect would predict that these two factors, liking and name-face congruency, will co-occur; this implies that a likeable person should possess a congruent name.

To explore this hypothesis, this chapter will present the results of three studies, each manipulating liking in a different way. In each case, the prediction is that likeable people will be named more congruently than unlikeable people.

Study 5: Naming Firefighters and Child Molesters

The aim of Study 5 was to manipulate liking based on social groups. Research has demonstrated that people use stereotypes to describe members of different social groups (Devine & Elliot, 1995; Karlins, Coffman, & Walters, 1969; Katz & Braly, 1933). Furthermore, other studies have shown that affective responses differ by social group, with different groups arousing different types of emotions (Cottrell & Neuberg, 2005; Fiske, Cuddy, Glick, & Xu, 2002). A study conducted by Cottrell and Neuberg (2005), which assessed participants' affective responses and threat perceptions of several groups which included feminists activists, African Americans, gay men, non-fundamentalist Christians, amongst others, found that different emotional profiles were experienced across these groups.

The current study took advantage of the affective nature of social stereotypes to manipulate affective responses toward the same targets. According to Breckler, Olson, and Wiggins (2005), firefighters are a social group usually associated with positive characteristics. Firefighters are usually accepted as positive role models in the community and even serve as mentors to high school students providing support as adult role models, encouraging youths' emotional development, and helping them improve academically (De Anda, 2001). Child molesters, on the other hand, are typically associated with negative stereotypes such as having a low level of intellect, being sexually frustrated or sexually obsessed, with possibly the most common stereotype being that they are strangers (the truth being that they are usually close friends or relatives) (Sanghara, 2006). Furthermore, one study which examined Midwestern College students attitudes on the appropriateness of expressing prejudice towards 105 different social groups, it was found that students rated

child abusers 3rd out of 105 (with child abusers and rapists occupying the top two positions), as a group to whom expressing prejudice was legitimate (Crandall, Eshleman, & O'Brien, 2002). Thus I assumed that targets would be judged more positively when described as firefighters than as child molesters. And, if positivity moderates the social bouba-kiki effect, then “firefighters” should be more congruently named than “child molesters”. As a control condition, there was also an attitude neutral group, in which no social category was specified, which was used for comparison.

Method

Participants

A total of 287 participants were recruited through Mechanical Turk and were remunerated US$0.45 for their contribution. There were 130 males (*M* age = 37.00, *SD* = 12.98), 156 females (*M* age = 33.10 years, *SD* = 9.16) and 1 person who identified as “Other”. Most participants (96%) used English as a first language and the majority (91%) lived in the USA. All participants were fluent in English. Informed consent was obtained from each participant at the start of the study.

Stimuli

Twenty black and white photographs were selected from the stimulus pool (10 round and 10 spiky). There were 3 separate, independent conditions created for the study, but the same faces were used in each condition.

Eight names were chosen from the stimulus set; four spiky (Mike, Nick, Rick, and Vic) and four round (Bob, Rob, Jo, and Tom). The same names were repeated on each trial across all 3 conditions.

Procedure

Participants were randomly assigned to one of three conditions. After giving informed consent, participants were told of our interest in "face perception", and that they would be asked to help us choose suitable names for 20 people. The names were to be ordered from best name (#1) to worst name (#8), and the most suitable names were to be placed at the top of the list and the least suitable names at the bottom. Participants assigned to the firefighter condition received the following additional information,

> In the following Study, you will be presented with 20 faces of volunteer firefighters. We would like to award these firefighters with certificates of bravery for all their service in keeping our communities safer, but unfortunately we don't know their names. However, we have a list of names which might be the actual names of the firefighters.

Participants assigned to the child molester condition instead read the following:

> In the following Study, you will be presented with 20 faces of convicted child molesters. We would like to add these individuals to a list of registered sex offenders, but unfortunately we don't know their names. However, we have a list of names which might be the actual names of the sex offenders.

Participants in the control condition read,

> In the following Study we are interested in your impressions of people. You will be presented with 20 faces. We don't know their names, but we have a list of names which might be the actual names of these people.

Once the participant had read the instructions, they completed 20 trials in which they saw a face in the centre of the screen with the 8 stimulus names listed below. Figure 20 is an example of a single trial taken from the child molester condition.

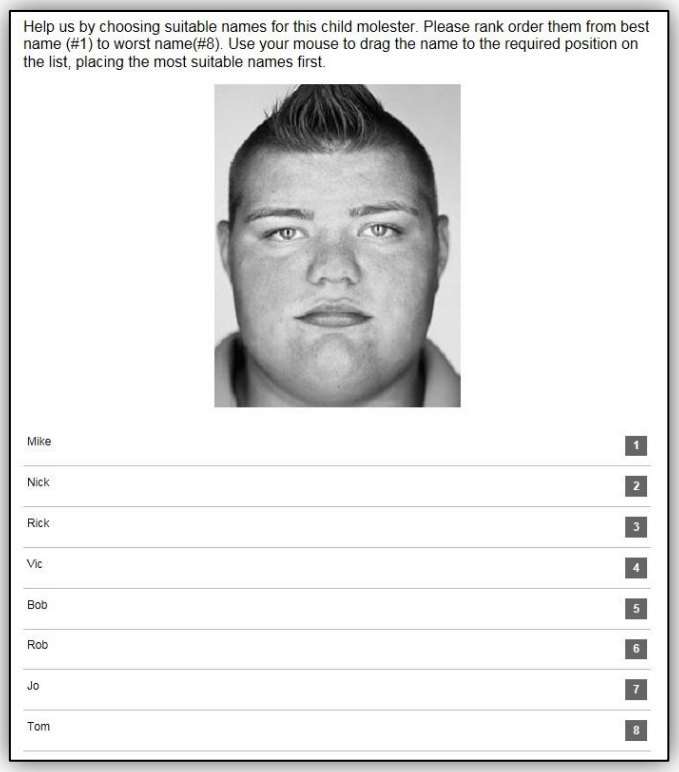


Figure 20: A sample trial taken from the child molester condition.

Once the participant had completed all 20 trials, they were asked to fill out a short demographic questionnaire and were then debriefed. In the debriefing information, participants were told that the individuals depicted in the study were in no way, to the researcher's knowledge, firefighters or convicted child molesters.

Results

For each face (round and spiky) a congruent score was calculated by averaging the name rank for the 4 round and 4 spiky names respectively. Table 15 shows congruent score

means, standard deviations and confidence intervals for the average ranking of congruent names. Lower values (closer to 1) indicate greater name congruency.

Table 15

Means, standard deviations and confidence intervals for congruent name ranking across all the 3 conditions.

Condition	**Face Shape**	**Congruent Score**	**Std. Deviation**	**95% Confidence Interval of the Difference**	
				Lower	**Upper**
Fire Fighters	Round	4.49	0.39	4.41	4.56
	Spiky	4.19	0.38	4.12	4.26
Child Molesters	Round	4.55	0.41	4.47	4.63
	Spiky	4.24	0.40	4.17	4.32
Control Group	Round	4.42	0.42	4.32	4.52
	Spiky	4.05	0.35	3.97	4.13

As an initial test, I wanted to examine whether participants named faces congruently or incongruently at levels greater than chance. Table 16 shows the results of a single sample *t*-tests conducted across each condition separately to determine if a difference existed between name ranking for round and spiky faces and chance ranking with a test value of 4.5. In all three conditions, spiky faces were named congruently above chance, but round faces were not.

Table 16

Results from a one sample t–test compared to a test statistic of 4.5

Condition	Face Shape	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval	
						Lower	Upper
Firefighters	Round	-0.37	107	.71	-0.01	-0.09	0.06
	Spiky	-8.51	107	.00	-0.31	-0.38	-0.24
Child molesters	Round	1.22	103	.23	0.05	-0.03	0.13
	Spiky	-6.61	103	.00	-0.26	-0.33	-0.18
Control Group	Round	-1.67	74	.10	-0.08	-0.18	0.02
	Spiky	-11.02	74	.00	-0.45	-0.53	-0.37

The data were analysed in a 2 (face shape) x 3 (condition) mixed model ANOVA, which revealed a significant difference for face shape (whether the face was round or spiky), $F(1, 283) = 86.90$, $p < .001$, *partial* $\eta^2 = .24$. Spiky faces ($M = 4.16$, $SE = .02$, 90% *CI* [4.12, 4.21]) were named more congruently compared to round faces ($M = 4.49$, $SE = .02$, 90% *CI* [4.44, 4.53]). There was no interaction between face shape and condition, $F(2, 283) = 0.42$, $p = .660$, *partial* $\eta^2 < .01$.

The ANOVA also revealed a main effect of condition, $F(2, 284) = 0.141$, $p < .001$, *partial* $\eta^2 = .06$. An independent samples *t*-tests indicated that firefighters were named congruently marginally more than child molesters, $t(210) = -1.66$, $p = .098$. There was a significant difference between the control group and firefighters, $t(187) = 2.56$, $p = .011$, and between the control group and child molesters, $t(177) = 3.94$, $p < .001$. Control faces were named significantly more congruently than firefighters or child molesters. The results appear in Figure 21.

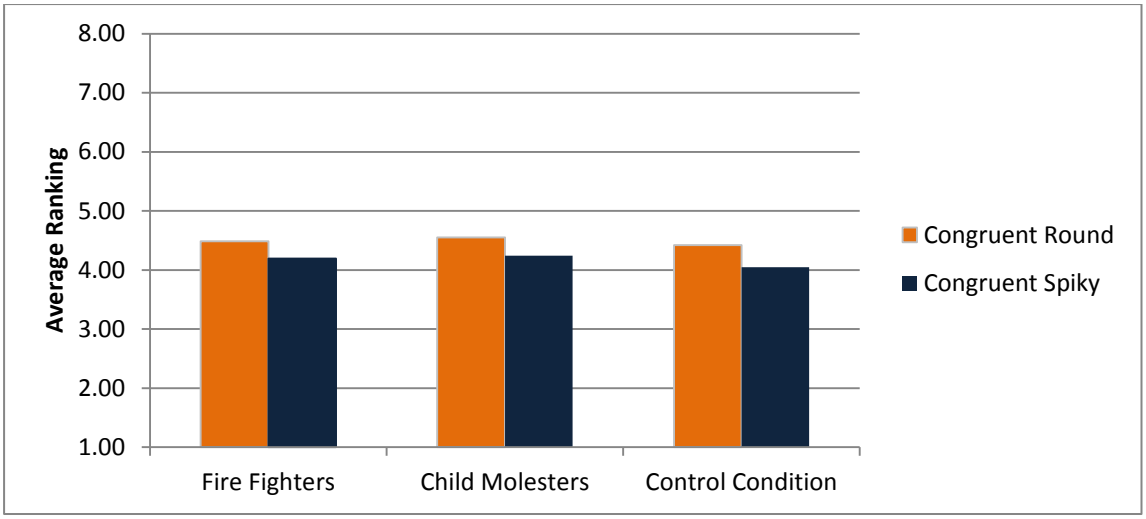


Figure 21. The difference in congruent naming between conditions. Lower values indicate greater congruence.

Face level Analysis

Another way of looking at the data is to consider the proportion of faces that were named congruently, as a function of their social group. Faces were coded as congruently named if the rank of congruent names, averaged across all participants in the relevant condition, was lower (closer to the top rank of 1) than the rank of incongruent names.

A chi-squared analysis revealed a non-significant difference between the congruent and incongruent groups for round faces, χ^2 (3, N = 10) = 1.09, p = .58; and spiky faces, χ^2 (3, N = 10) = 2.07, p = .35. Figure 22 and 23 shows the percentage of round and spiky faces classified as congruent versus incongruent in each condition.

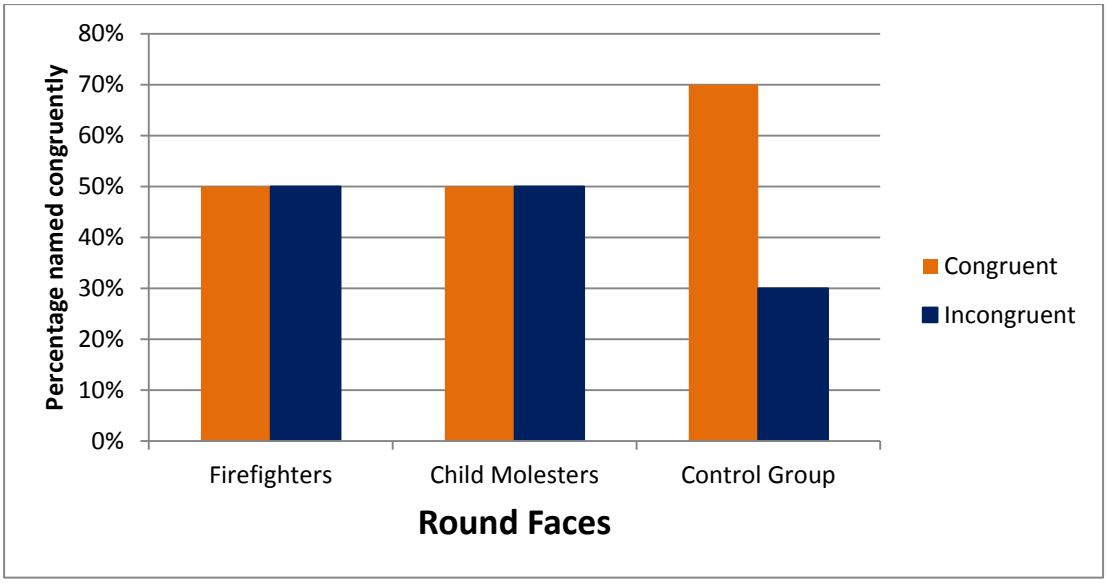


Figure 22. Percentage of round faces named congruently and incongruently.

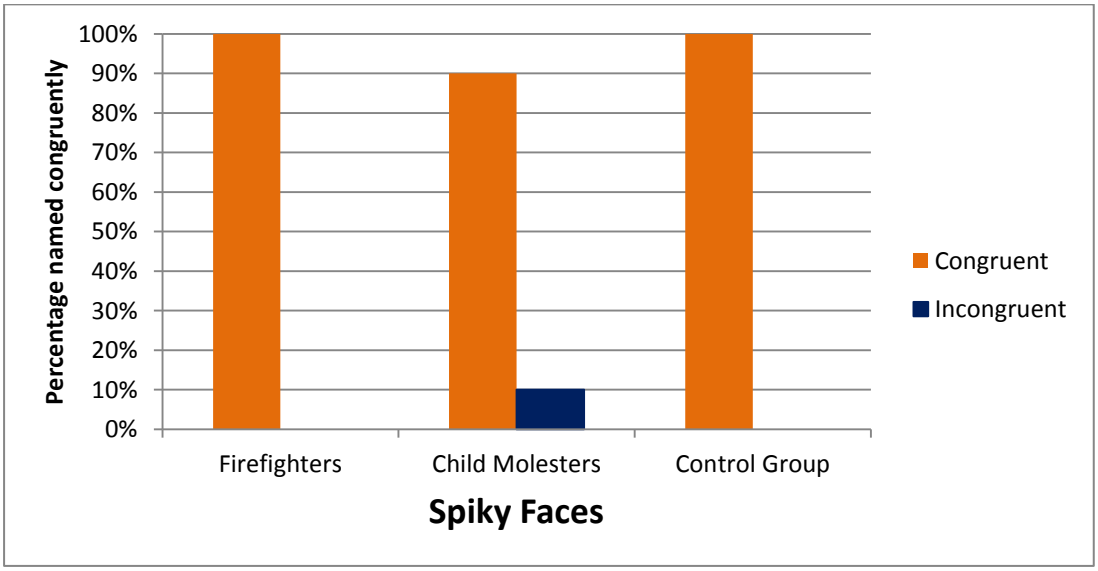


Figure 23. Percentage of spiky faces named congruently and incongruently.

Discussion

Study 5 was a preliminary test of the hypothesis that people perceived positively are assumed to have names congruent with their faces, an instantiation of the halo effect. The results provide some support for the hypothesis, in that firefighters, a very positive social

group, were named more congruently than child molesters, a very negative social group, although the difference was only not significant.

Unexpectedly, however, both child molesters *and* firefighters were named less congruently than faces with no category membership. This was expected for child molesters who usually are associated with negative stereotypes (Marshall, 1996; Sanghara, 2006) and who have been legitimised to be treated with prejudice (Crandall et al., 2002). However, firefighters are usually more positively stereotyped (De Anda, 2001), thus it was expected that they would have been judged more positively. One possible explanation for this finding is that firefighters were not seen as positively as expected. Evidence supporting this notion is found in the context of social identity theory, which argues that people tend to view their own groups more positively in comparison to outgroups (Billig & Tajfel, 1973). Furthermore, out-group members, which firefighters would have been to most participants, are seen as possessing more undesirable traits compared to in-group members who are seen as possessing more favourable traits (Baron, Byrne, & Branscombe, 2006). Thus, one reason why firefighters may have been named less congruently than control targets may be that, although "firefighter" is a positive designation, "outgroup member" is not.

There was also a main effect of face shape; spiky faces were named congruently significantly more than round faces, independent of group membership. The finding is consistent both with the liking ratings reported in previous studies in the thesis, as well as with the hypothesis that liked faces are named more congruently. As noted previously, round-faced men are usually seen as more aggressive and threatening than are men with more spikier faces (Haselhuhn et al., 2015). Interestingly, the round-faced child molesters were named, numerically, the least congruently of all groups, consistent with an additive effect of group membership and face shape.

Despite these possibilities, the results were not strongly or unambiguously supportive of an effect of liking on congruency, and the design of the study could be strengthened. Once again, there were a limited number of names and faces used, increasing the possibility that either the faces, or the firefighter and child molester labels, may have had pre-existing associations with particular names. But another, unique aspect of the current study is that participants only experienced one condition: all faces were purportedly of firefighters, or all were of child molesters. A better approach would involve designing a procedure in which participants completed both positive and negative trials thus experiencing both types of social categories, and balancing their exposure time.

In the next study several improvements are implemented. First, there were 40 faces instead of 20, and the faces were randomly mapped to names from a pool of 50 round and spiky names (Appendix B), thus increasing name variability. Most importantly, liking was manipulated within subjects, not via category membership, but by facial attractiveness.

Study 6: Naming Attractive and Unattractive Faces

Attractiveness has long been considered an important factor which increases liking. Attractive people tend to benefit on several fronts by triggering the “beautiful is good” stereotype. Attractive people are generally judged and treated more positively than unattractive people (Langlois et al., 2000): they are judged as more honest (Atoum & Al-Simadi, 2000); they are considered to be warmer, stronger, more poised, interesting, sociable, independent, dominant, exciting, sexy, well adjusted, socially skilled, successful, more masculine (for men) and more feminine (for women) (Diener, Wolsic, & Fujita, 1995; Dion & Dion, 1987; Hatfield & Sprecher, 1986).

These positive inferences pay dividends in terms of social outcomes. For example, attractive children are more popular and are shown more leniency by adults (Clifford & Walster, 1973; Langlois, 1986); attractive adults experience more co-operation and assistance

from others (Sigall, Page, & Brown, 1971); attractive people get better job recommendations and higher pay (Cash, Gillen, & Burns, 1977; Hamermesh & Biddle, 1994); they are less likely to be convicted of crimes, and receive lighter sentences when they are convicted (Efran, 1974); and they gain more votes and are more likely to win elections (Rosar, Klein, & Beckers, 2008).

In short, attractiveness carries a strong halo, with attractive people judged more positively on multiple dimensions, and consequently treated better. If, as hypothesised, congruent names are part of that halo, then attractive people should be named more congruently than unattractive people.

Method

Participants

A total of 98 participants were recruited through Mechanical Turk and remunerated US$0.60 for their contribution. There 39 males (*M* age = 36.32 years, *SD* = 10.22) and 59 females (*M* age = 40.15 years, *SD* = 12.35). Most participants (99%) used English as a first language and the majority (96%) lived in the USA. All participants were fluent in English. Informed consent was obtained from each participant at the start of the study.

Stimuli

Eighty-two black and white photographs of Caucasian males (42 round and 40 spiky) were selected from the stimulus pool and pre-rated on attractiveness by a sample of 97 Mechanical Turk participants. Participants rated the faces on a 9-point sliding scale anchored at 1 (Very Unattractive) to 9 (Very Attractive) (see Figure 24 for an example). Cronbach's alpha was high for attractiveness ratings, α = .978, indicating excellent agreement between participants.

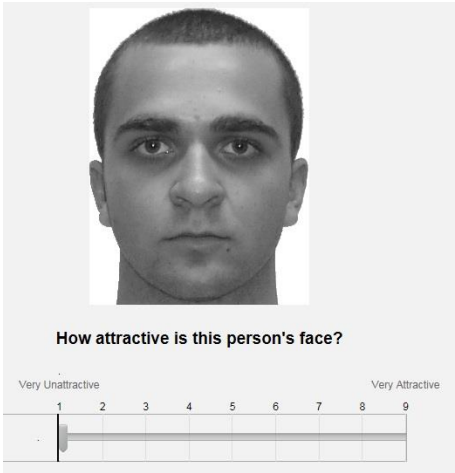


Figure 24. Sample attractiveness ratings trial from Study 6.

From the sample of 82 faces, 40 faces were selected (made up of the most attractive and the least attractive faces in the sample). The final set consisted of 10 round attractive, 10 round unattractive, 10 spiky attractive and 10 spiky unattractive faces. An independent samples *t*-test confirmed a significant difference between attractive (M = 4.76, SD = 0.54) and unattractive (M = 2.89, SD = 0.36) round faces, t (18) = 9.11, p < .001, and between attractive (M = 5.72, SD = 0.45) and unattractive (M = 2.99, SD = 0.56) spiky faces, t (18) = 12.04, p < .001.

Eight names (4 round and 4 spiky) were randomly assigned to each face from a pool of 50 names (Appendix B) sourced from the stimulus pool. Once assigned, the names remained with the faces for the duration of the study.

Procedure

Participants were directed to a Qualtrics survey. They were told that the survey involved a study in face perception. They were asked to read the instructions carefully before commencing. After giving informed consent, they were given the survey instructions which stated,

> In the following Study, you will be presented with 40 people. We don't know their names, but we have a list of names which might be the actual names of these people. Please help us by choosing suitable names for these people. Names should be ordered from best name (#1) to worst name (#8), so please place the most suitable names at the top of the list.

Once participants had read the instructions, they completed 40 trials in which they saw a face in the centre of the screen and a random selection of eight names (4 round and 4 spiky) below the image. They were instructed to rank-order the names from best to worse (Figure 25). Following the survey, participants were debriefed and completed a brief demographics questionnaire.

Figure 25. Sample trial from Study 6.

Results

Table 17 shows the means and standard deviations for ranking averages. Lower values indicate that congruent names were given relatively good rankings (high on the list).

Table 17

Means, standard deviation, and confidence intervals for congruent name ranks across attractive and unattractive round and spiky face.

Face Shape/ Attractiveness	**Congruent Names Ranking Average**	**Std. Deviation**	**95% Confidence Interval**	
			Lower	**Upper**
Round Attractive	3.92	0.49	3.81	4.01
Round Unattractive	4.50	0.29	4.44	4.56

Spiky Attractive	4.34	0.30	4.28	4.40
Spiky Unattractive	4.60	0.40	4.51	4.67

The data were analysed in a 2 (face shape) x 2 (attractiveness) ANOVA, which revealed a significant main effect for face shape (whether the face was round or spiky), $F(1,97) = 43.03$, $p < .001$, *partial* $\eta^2 = .31$. Round faces ($M = 4.21$, $SE = 0.03$, 95% *CI* [4.16, 4.26]) were named significantly more congruently than spiky faces ($M = 4.47$, $SE = 0.02$, 95% *CI* [4.42, 4.52]). There was also a main effect of attractiveness, $F(1,97) = 69.82$, $p < .001$, *partial* $\eta^2 = .42$. Attractive faces ($M = 4.13$, $SE = 0.03$, 95% *CI* [4.06, 4.19]) were named significantly more congruently than unattractive faces ($M = 4.55$, $SE = 0.03$, 95% *CI* [4.5, 4.6]).

There was a significant interaction between face shape and attractiveness, $F(1,97) = 33.11$, $p < .001$, *partial* $\eta^2 = .25$. Although attractive faces were given more congruent names for both round faces, $t\ (97) = -9.36$, $p < .001$, and spiky faces, $t\ (97) = -4.86$, $p < .001$, the advantage was greater for round faces. The interaction is plotted in Figure 26.

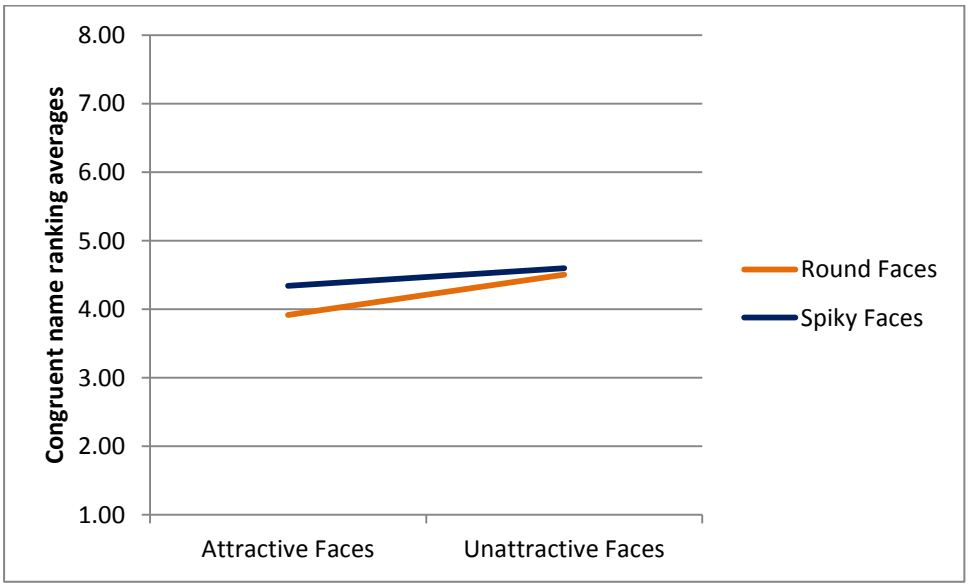


Figure 26. Interaction between face shape and attractiveness.

One sample *t*-tests

To determine which conditions differed from a chance ranking, one sample *t*-tests were conducted which compared the means of congruent-name rankings for round and spiky attractive and unattractive faces to a chance ranking of 4.5 (Table 18). Round and spiky attractive faces were named congruently better than chance. Round unattractive faces were no better than chance, but interestingly spiky unattractive faces were named *incongruently* at a level greater than chance.

Table 18

One sample t-tests conducted across face shape and attractiveness levels for congruent name rankings.

Face Shape/ Attractiveness	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference** (Between Mean and Chance Rankings)	**95% Confidence Interval**	
					Lower	**Upper**
Round Attractive	-11.76	97	.000	-0.58	-0.68	-0.49
Round Unattractive	0.08	97	.938	0.00	-0.06	0.06
Spiky Attractive	-5.21	97	.000	-0.16	-0.22	-0.10
Spiky Unattractive	2.44	97	.016	0.10	0.02	0.18

Face level Analysis

Another way of looking at the data is to consider the proportion of faces that were named congruently, as a function of their attractiveness. Faces were coded as congruently named if the rank of congruent names, averaged across all participants in the relevant condition, was lower (closer to the top rank of 1) than the rank of incongruent names.

A chi-squared analysis revealed a marginally significant difference between attractive and unattractive round faces, χ^2 (2, N = 20) = 3.81, p = .051; and spiky attractive and unattractive faces χ^2 (2, N = 20) = 3.33, p = .068. Figure 27 shows the percentage round and spiky attractive and unattractive faces classified as congruent versus incongruent in each group.

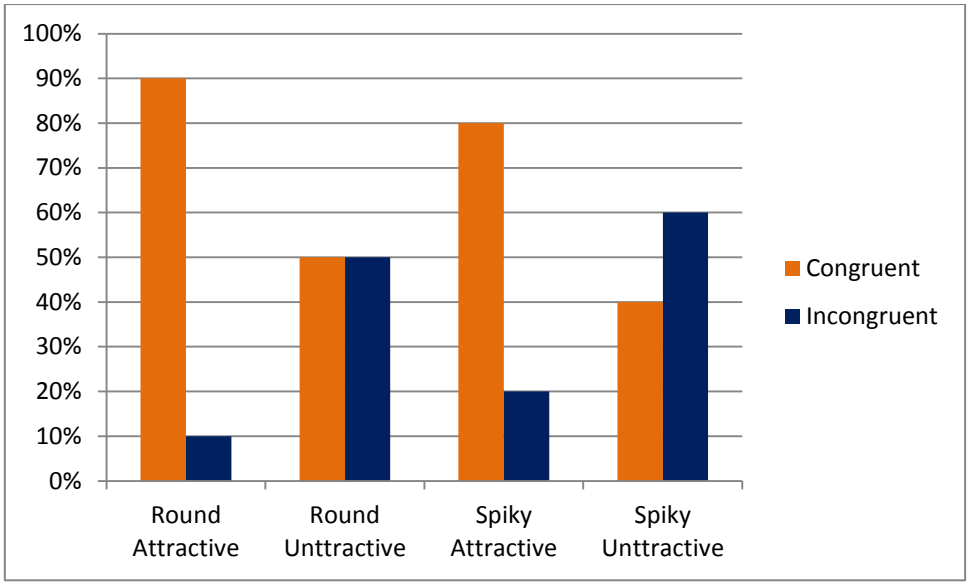


Figure 27. Percentage of faces named congruently and incongruently.

Discussion

The results showed that attractive round and spiky faces were more likely to be given congruent names than unattractive round and spiky faces, supporting the hypothesis that the positivity of a stimulus moderates the name it is presumed to have. This result is consistent with research on attractiveness, which shows a strong association between attractiveness and positivity (Diener et al., 1995; Langlois, 1986). Several studies have shown that attractive people are rated positively on other dimensions as well (Dion, Berscheid, & Walster, 1972; Efran, 1974; Hamermesh & Biddle, 1994; Rosar, Klein, & Beckers, 2008). The fact that attractive people were more likely to be named positively (i.e. congruently) may therefore be a function of the "beautiful is good" stereotype. In this case, being attractive may have necessitated the need for a "good" name, which was consistent with the stereotype. Furthermore, attractive people have been shown to receive better treatment from others (Clifford & Walster, 1973; Hamermesh & Biddle, 1994; Sigall et al., 1971), which is consistent with the current results, assuming the better treatment in this case was to receive a congruent name.

Interestingly, unlike Study 5, there was a strong preference towards round faces, albeit only attractive ones. Round attractive faces were overall named *more* congruently than spiky attractive faces, *and* round and spiky unattractive faces. This was an interesting finding because round faces in general are usually rated more negatively due to their more threatening appearance (Geniole, Denson, Dixson, Carre, & McCormick, 2015; Haselhuhn et al., 2015). However, these particular round faces were also attractive, and thus would have benefited from the "beautiful is good" stereotype (Dion et al., 1972). People who benefit from this stereotype are considered warmer, stronger, and more poised, among other positive attributions (Diener et al., 1995). These additional factors associated with the "beautiful is good" stereotype may have played a pivotal role in increasing liking for these faces. For instance, instead of appearing as threatening, they may have appeared as warm. Furthermore, seeing people with round attractive faces may have been a novel experience as these face shapes are usually more unattractive, which may have highlighted the faces even more. Indeed, people who are statistically rare or are visually highlighted have been shown to attract more attention (Taylor & Fiske, 1978). In this case, that attention may have been more positive, which resulted in being named more congruently.

As mentioned before, there are several attributes automatically assigned to attractive people. For instance, research shows that attractive people are considered more honest (Atoum & Al-Simadi, 2000); less guilty of crimes (Efran, 1974); warmer, stronger, more poised, interesting, sociable, independent, dominant, exciting, sexy, well adjusted, socially skilled, successful, more masculine and more feminine (Diener et al., 1995; Dion & Dion, 1987; Hatfield & Sprecher, 1986). Thus, it might not be attractiveness *per se* which causes congruent naming, but rather some characteristic associated with attractiveness. The proximate mechanism is not critical for the present purposes, but future researchers may wish

to identify what aspects of attractiveness are associated with congruent naming (and other social judgments).

Although the current study implemented several methodological improvements (more faces and names, within-subject variability) a weakness is that each face could obviously only appear in one condition, attractive or unattractive. Thus, the possibility is still open that particular faces were associated with round and spiky names, for reasons other than their attractiveness. This issues is addressed in Study 6, in which liking was manipulated within the same targets, by using smiling and nonsmiling versions of the same people.

Study 7: Naming Smiling and Neutral Faces

Smiling has been reported to have a positive influence on likeability. Research using smiling and nonsmiling targets found that smiling targets were rated as more likeable, more intelligent, and more warm (Lau, 1982). The aim of Study 7 was to use smiling as a manipulation of liking, in order to test the hypothesis that likable people will be named more congruently than neutral people.

Method

Participants

There were a total of 201 participants recruited through Mechanical Turk and given a small payment (US$0.60) for their participation. There were 113 males (*M* age = 42.50 years, *SD* = 13.37), 86 females (*M* age = 36.40 years, *SD* = 11.22) and 2 participants identified as “Other”. Most participants (97%) used English as a first language and the majority (95%) lived in the USA. All participants were fluent in English. Informed consent was obtained from each participant at the start of the study.

Stimuli

Forty black and white photographs of Caucasian males which had both a smiling and neutral version of the same person were selected from the stimulus pool described in Chapter 2. The sample consisted of 20 round and 20 spiky faces. Half of the round and half of the spiky faces appeared in their smiling versions, and the other half in their neutral versions (counterbalanced). Figure 28 is an example of a trial which shows a round smiling face. This person would then appear in the counterbalanced condition with a neutral facial expression as in Figure 29.

Procedure

The procedure and instructions were identical to Study 6 .

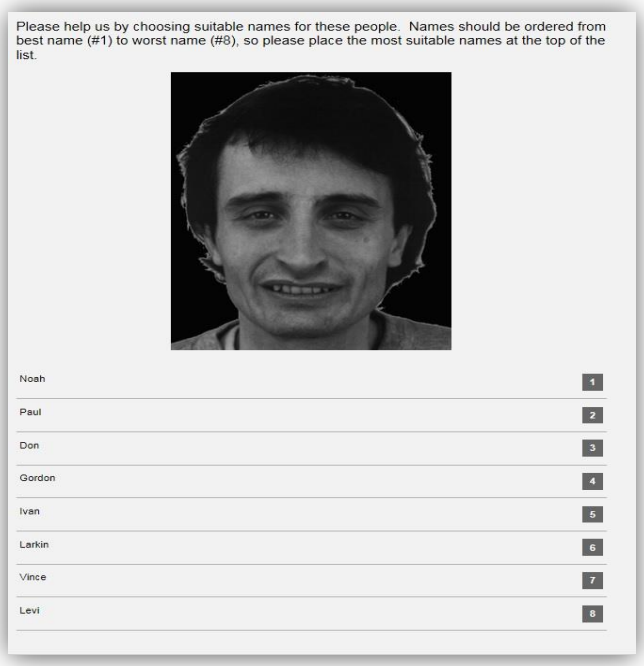


Figure 28. Typical trial of a face appearing with a smiling expression.

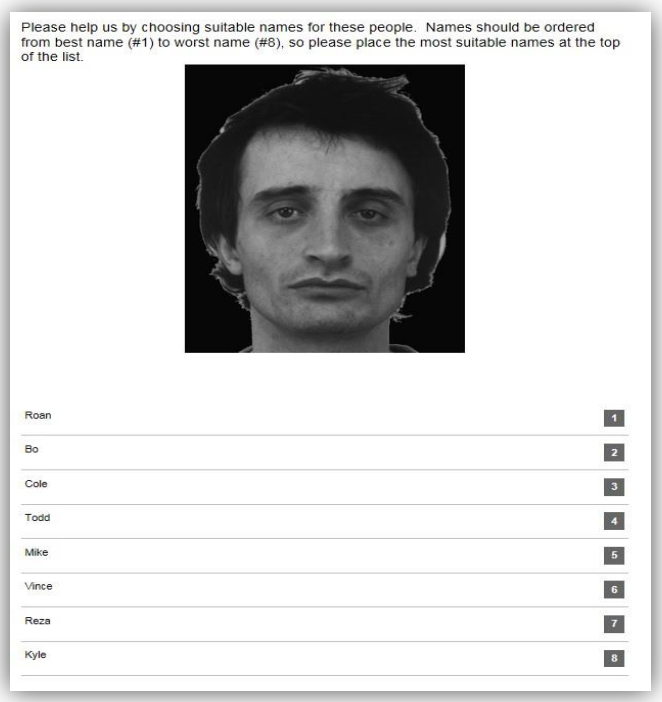


Figure 29. Typical trial of a face appearing with a neutral expression.

Results

The data were analysed in the same manner as in Study 6. Table 19 shows means and standard deviations for ranking averages. The lower values represented higher congruency.

Table 19

Means, standard deviations and confidence intervals for congruent name ranks across smiling and neutral round and spiky faces.

Face Shape/ Expression	**Congruent Ranking Means**	**Std. Deviation**	**95% Confidence Interval of the difference**	
			Lower	**Upper**
Round Smiling	3.92	0.46	3.85	3.98
Round Neutral	4.58	0.26	4.45	4.62

Spiky Smiling	4.40	0.30	4.36	4.45
Spiky Neutral	4.75	0.42	4.69	4.81

The data were analysed in a 2 (face shape) x 2 (facial expression) ANOVA, which revealed a main effect for facial expression, $F(1, 201) = 209.68$, $p < .001$, *partial* $\eta^2 = .51$. Smiling faces ($M = 4.17$, $SE = 0.02$, 95% *CI*[4.12,4.21]) were named congruently significantly more than neutral faces ($M = 4.67$, $SE = 0.02$, 95% *CI*[4.63,4.71]). There was a also a main effect for face shape, $F(1,200) = 126.99$, $p < .001$, *partial* $\eta^2 = .39$. Round faces ($M = 4.25$, $SE = 0.02$, 95% *CI*[4.22,4.29]) were named congruently significantly more than spiky faces ($M = 4.58$, $SE = 0.02$, 95% *CI*[4.55,4.62]).

There was a significant interaction between face shape and facial expression $F(1,201) = 79.82$, $p < .001$, *partial* $\eta^2 = .28$. Smiling faces were named more congruently for both round, $t\ (201) = -17.14$, $p < .001$, and spiky faces, $t\ (201) = -8.75$, $p < .001$. Overall the advantage for congruent naming was greater for round faces. The interaction is plotted in Figure 30.

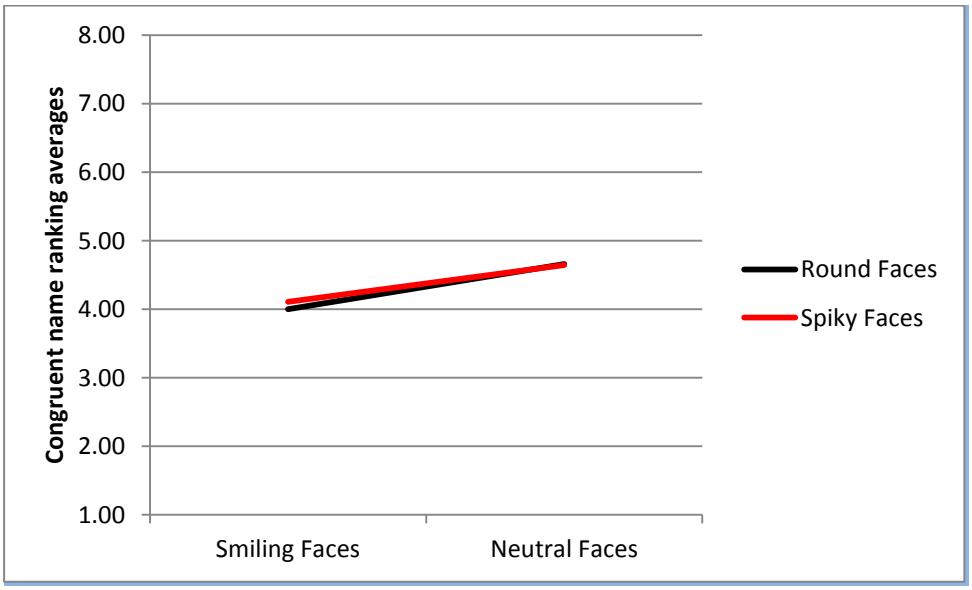


Figure 30. Interaction between facial expression and face shape.

To determine which conditions differed from chance ranking, one sample *t*-tests were conducted comparing the means for the congruent-name rankings of round and spiky smiling and neutral faces to a chance value of 4.5 (Table 20). Round and spiky smiling faces were named congruently significantly better than chance. Round and spiky neutral faces were named *incongruently* at a level greater than chance.

Table 20

One sample t-test of groups, with test value of 4.5.

Face Shape/ Expression	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference** (Between Mean and Chance Rankings)	**95% CI Lower**	**95% CI Upper**
Round Smiling	-17.61	201	.000	-0.58	-.64	-.51
Round Neutral	4.54	201	.000	0.09	.05	.12
Spiky Smiling	-4.17	201	.000	-0.09	-.13	-.05
Spiky Neutral	8.42	201	.000	0.25	.20	.31

Face Analysis

Again we looked at the data by considering the proportion of faces that were named congruently, as a function of their facial expression. Faces were coded as congruently named if the rank of congruent names, averaged across all participants in the relevant condition, was lower (closer to the top rank of 1) than the rank of incongruent names.

A chi-squared analysis revealed a significant difference between smiling and neutral round faces, χ^2 (2, N = 20) = 13.79, $p < .01$; and spiky faces χ^2 (2, N = 20) = 9.23, $p < .01$. Figure 31 shows the percentage round and spiky smiling and neutral faces classified as congruent versus incongruent in each group.

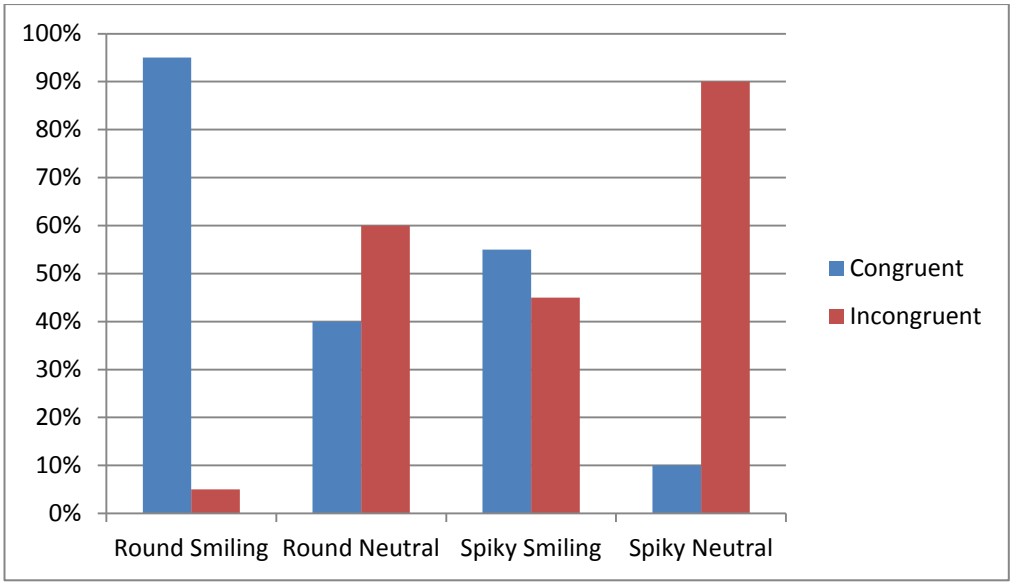


Figure 31. Percentage of round and spiky smiling and neutral faces named congruently versus incongruently.

Discussion

The results supported the hypotheses that smiling faces would be named more congruently than neutral faces. This finding lends further support to the hypothesis that liking moderates name-face congruency. Effectively, this study replicated the findings from Study 6 which found the same effect with attractive and unattractive faces.

In the current study, both round and spiky smiling faces were named significantly more congruently than neutral faces. Indeed, neutral faces were named significantly more *incongruently* as their ranking averages were above chance ranking of 4.5 (averages above 4.5 showed that more incongruent names were chosen for faces). In contrast, smiling faces had a ranking average significantly lower than 4.5. This finding that smiling faces were named more congruently is consistent with past research which has demonstrated that smiling faces are considered more likeable, warm, intelligent, and happy (Lau, 1982; Otta, Abrosio, & Hoshino, 1996). Thus the findings here support the hypothesis that liking for someone results in greater name-face congruency.

As in Study 6, it is not necessarily the case that smiling was the direct cause of congruent naming. For instance, smiling faces are perceived as warmer than non-smiling faces (Lau, 1982), which means that the congruence effect might not necessarily result from the fact that targets were smiling, but rather that they projected a feeling of warmth to the participants. Furthermore, smiling faces have also been noted to increase a person's level of attractiveness, and even compensate for relative unattractiveness (Golle, Mast, & Lobmaier, 2013). Hence, it might be that participants were not responding so much to the emotional expression of the target, as much as they were responding to the person's attractiveness. Again, the relationship between smiling and liking is not as important as the relation between liking and congruent naming, but future research could investigate the proximate mechanisms further.

General Discussion

In the previous chapter, I showed that face-name congruency causally influenced liking; the more congruent a person's name was the more they were liked. However, this effect does not rule out the reverse causal path; liking may cause or moderate name face congruency, at least in the laboratory. This might arise due to the halo effect which occurs when one characteristic of a person causes all their other characteristics to be viewed in a similar vein (Thorndike, 1920). In the studies reported in this chapter, individuals who were in a positive social category, who were more attractive, or who had a positive facial expression, were presumed more likely to have face-congruent names. Kahneman (2003) believes that one favourable trait evaluation (for example, warmth) leads to further favourable evaluations about other traits or dimensions. Analogously, participants who viewed targets positively may have named them congruently because of the positive nature of having a congruent name.

The evidence in this chapter is convergent. Each of the three studies presented here manipulated liking in a different way. In Study 5, liking was manipulated by way of social categorisation. The general consensus about firefighters is that they are perceived as positive members of society (Breckler et al., 2005) while child molesters are perceived as stereotypically negative (Marshall, 1996; Sanghara, 2006). Hence the affect dichotomy produced by including two opposing social groups was intended to increase liking for one while reducing it for the other through the activation of particular stereotypes. The results from Study 5 partially supported this hypothesis because firefighters were named (marginally) more congruently, and only for spiky faces. Unexpectedly, however, the *control* condition achieved the highest level of name-face congruency. It is not clear whether faces in the control condition were seen more positively, or whether the effects were driven by outgroup biases (Billig & Tajfel, 1973), or even artefacts of the limited numbers of faces and names.

In Study 6 I used attractiveness as a means of manipulating liking. Attractive people benefit from the “halo” phenomenon (Thorndike, 1920) or the “beautiful is good” stereotype (Dion et al., 1972). As predicted, attractive faces were named more congruently than unattractive faces, thus lending further support for the hypothesis that liking moderates name-face congruency. One of the concerns from this study was that each face only appeared only once, as either attractive or unattractive: different faces appeared in the two experimental groups, raising the possibility that some other factor besides likeability influenced the results.

To address this issue, in Study 7 I used smiling as an independent variable. Smiling is another factor which has been shown to strongly influence liking (Golle et al., 2013; Lau, 1982). The advantage of this method was that I could manipulate liking across the same person by presenting them in one photo as smiling and in the other as neutral. If liking moderated name-face congruency, then people who were smiling should be named more

congruently than people who were not smiling (neutral). The results supported this hypothesis. Both round and spiky smiling people were named significant more congruently than their non-smiling counterparts. Thus the results further supported the hypothesis that liking moderated name-face congruency.

One finding across the three studies worth discussing here is related to the difference in name-face congruency between round and spiky faces. In Study 5, positive round faces were named significantly less congruently than spiky faces, but the opposite was true in Studies 6 and 7. For Study 5, the findings support the notion that participants disliked round faces more because they would have been reacting to the negative characteristics exemplified by round faces (Haselhuhn et al., 2015). This would also support the prediction that round faced individuals would be named less congruently overall, which is what was found in Study 5. However, Study 6 and 7 found round attractive and smiling faces to be named more congruently overall. The main difference though, was that in these two studies, round congruent faces were either attractive or smiling, which would have enhanced their positivity. The positivity created by factors related to attractiveness (Dion et al., 1972) or smiling (Lau, 1982) may have overcome the negative effects of their “roundness” (Haselhuhn et al., 2015). These more positive aspects of what would otherwise have been negative faces may have heightened their saliency, with the increased novelty of finding a positive round face engendering higher levels of name-face congruency.

Although name-face congruency appears to be moderated by positivity, it is unclear which variables are more strongly associated with the effect. There are several stereotypes associated with being fire fighters, an attractive person and or a smiling person, and there may be common factors which occur across all three. Further research might uncover more specifically which factors are more associated with name-face congruency, but for the purposes of this thesis, the objective was simply to manipulate likeability and explore its

effect on name-face congruency. To that end, the studies reported in this chapter have contributed to explaining how liking in general influences name-face congruency.

The interactions with face shape notwithstanding, the studies from this chapter generally lend support to the hypothesis that liking moderates name-face congruency, suggesting that name-face congruency is a positive individual difference that is associated with other positive features. If so, it may be possible to predict more significant social outcomes from individuals name-face fit. For example, previous research has already used simple facial judgments (e.g., of competence) to predict election outcomes (Olivola & Todorov, 2010; Todorov et al., 2005). In the next chapter, I consider whether the congruency of a candidate's name and face can predict their electoral success.

Chapter 7: The Relationship of Name-face congruency to political success

Studies 1 to 7 have shown that (1) people name faces non-arbitrarily, consistent with the bouba-kiki effect, such that round and spiky names are judged as more suitable for round and spiky faces, respectively; (2) people whose face and name shapes do not match are liked less than those whose names and faces do match; and (3) the matching effect is more pronounced when faces are already likeable (e.g., attractive, or associated with a positive social group), than when they are unlikeable, consistent with a schema that positive individuals should have a congruent name-face relationship.

Although the results so far are consistent, they are relatively small, and may depend on the use of extreme round and spiky exemplars. It is reasonable to ask, then, whether there are circumstances in the real world where name-face congruency makes a measurable difference to an individual, especially where faces and names are average in shape, and where there are many competing influences on impression formation.

One such circumstance is found in politics. This domain has received considerable research regarding factors that can predict success. Studies suggest that voters are able to extract trait information from faces very rapidly and make their voting decisions based on this limited information (Ballew & Todorov, 2007). Even children can predict electoral success as accurately as adults with very little information (Antonakis & Dalgas, 2009). These findings suggest that voters are able to pick out electoral winners with minimal information about the candidate, and simply seeing their face, even fleetingly, may be sufficient. Factors which have been found to influence vote share in the past include attractiveness (Rosar et al., 2008), competence (Olivola & Todorov, 2010; Todorov et al., 2005), and facial stereotypes (Olivola, Sussman, Tsetsos, Kang, & Todorov, 2012). Even facial morphing has been found to increase votes when the candidate's face was morphed to look more like that of the voters (Bailenson,

Iyengar, Yee, & Collins, 2008). In Study 8, I considered whether name-face congruency is one of these factors. If a candidate has a name which is a good match for his face he may receive more votes because according to Study 2a and 2b, people with congruent names are liked more than those with incongruent names, and they are rated higher on positive personality traits.

Study 8: The Consequence of a Good Name on Political Success

The aim of Study 8 was to assess the electability of political candidates based on how well their name matched their face. The hypothesis was that political candidates who had names which were good matches for their faces would gain higher vote shares compared to those candidates whose names did not match their faces well.

Method

Participants

A total of 199 participants were used in this study. All participants were recruited through Amazon Mechanical Turk and remunerated US$0.60 for their participation. There were 92 males (*M* age = 42.67 years, *SD* = 13.58) and 107 females (*M* age = 37.40 years, *SD* = 12.41). The majority of the participants lived in the USA (93%) and spoke English as their first language (97%). All participants were fluent in English. Informed consent was obtained from each participant at the start of the study.

Stimuli

The stimulus faces were 158 political candidates who ran for the United States Senate between 2000 and 2008 inclusive. All candidates were selected from races in which the two

primary opponents were both male Caucasians. Photographs of each candidate were sourced from the Internet using Google and Bing image searches; they were standardised to be 190 pixels wide (keeping height in proportion), and ranged in quality from 96 dots per inch (dpi) to 300 dpi; 96% were in colour. The data pertaining to candidates first and last names and their individual vote shares (the proportion of votes won in the election) were obtained from a data file used in previous studies on political success (Olivola & Todorov, 2010; Todorov et al., 2005).

Procedure

Face roundedness and name roundedness ratings were collected in two separate surveys, run simultaneously but using independent samples of participants (who were randomly assigned to take one of the surveys). Both the surveys were run via the Internet using Qualtrics survey software.

Face-Rating Survey

Participants assigned to the face-rating task were given the instructions below. Two example faces appeared below the instructions. Figure 32 shows the look of a typical trial.

> This survey is about the intuitive "feel" of people's faces. We are especially interested in the "roundness" or "spikiness" of a face. You might notice that some people's faces intuitively look rounder or spikier than others. For example, many people say that the face in Picture 1 looks very round, while the face in Picture 2 looks very spiky.
>
> Today, you will be presented with 158 faces of people who ran for the United States Senate. Your task is simply to rate each person's face on how round or spiky it looks, using a scale from 1 (Very Round) to 9 (Very Spiky).

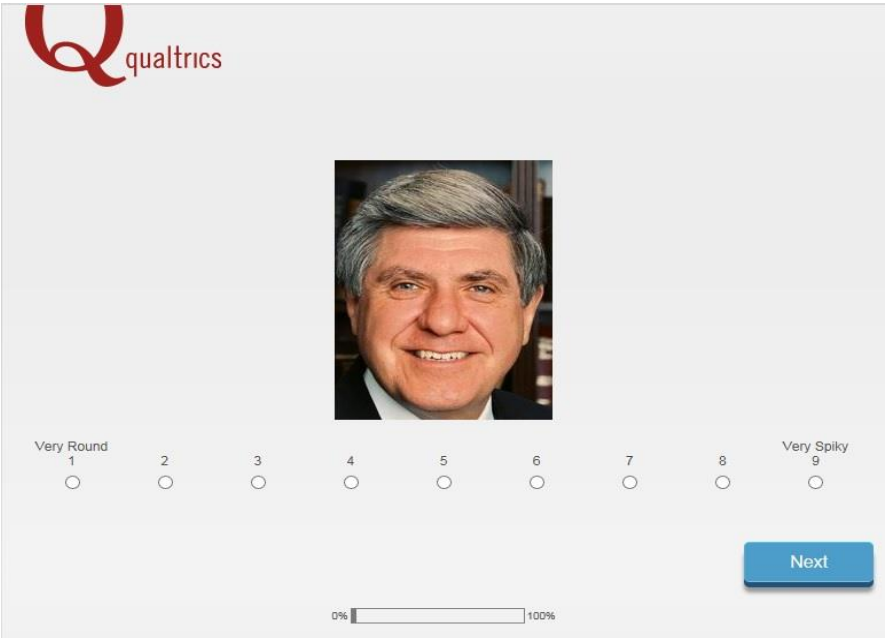


Figure 32. Example of a face-rating trial

Name-Rating Survey

Participants assigned to the name-rating task were given the instructions below. Figure 33 is an example of a typical trial.

This survey is about the intuitive “feel” of people’s names. We are especially interested in the “roundness” or “spikiness” of a person’s name. You might notice that some names intuitively feel "rounder" or "spikier" than others. For example, many people say that the name "Joe Boone" feels very round, but the name "Zeke Vicken" feels very spiky.

Today, you will be presented with 158 names of people who ran for the United States Senate. Your task is simply to rate each name on how round or spiky it feels, using a scale from 1 (very round) to 9 (very spiky). Take into account both the first and last

names when you make your overall rating. Some people find it helpful to say the names out aloud before making their rating.

Figure 33. Example of name-shape rating trial

In all tasks, names or faces appeared in a unique random order for each participant, in the centre of the screen. Names appeared in bold in 80-pixels Arial font. Participants recorded their responses by clicking on the appropriate button with their mouse.

Results

Interrater reliability, measured as Cronbach's Alpha, was high for all tasks and is reported in Table 21.

Table 21

Interrater agreement, including Cronbach's alpha, Number of stimuli rated and no of raters, across the face shape and name shape rating survey.

Survey	N Cases	Cronbach's alpha	No of Raters
Face Shape Rating	158	0.97	94
Name Shape Rating	158	0.97	105

Ratings were averaged across participants in each task to create single face roundedness and name roundedness scores for each candidate. Matching scores were calculated for each candidate by taking the absolute difference between the candidate's standardized name and face roundedness ratings. Thus, a higher score indicated a poorer fit between a candidate's name and face. Mean name-face congruency was 1.18, with a standard deviation of 0.84, and a range of 0.02 to 3.91. The distribution was right skewed (Skewness = 0.84). The data for each candidates election id, race, electoral year, state, party, age of candidate at time of election, average face shape, average name shape, their matching score and vote share appear in Appendix C.

As an initial look of the predictive power of name-face congruency among candidates. A Pearson's correlation was computed between match score and vote share (the number of votes cast for a candidate relative to the total number cast in the election). The correlation between matching score and vote share was negative and nonsignificant, r = -.077, p = .334. The linear relationship between the two variables is plotted in Figure 34.

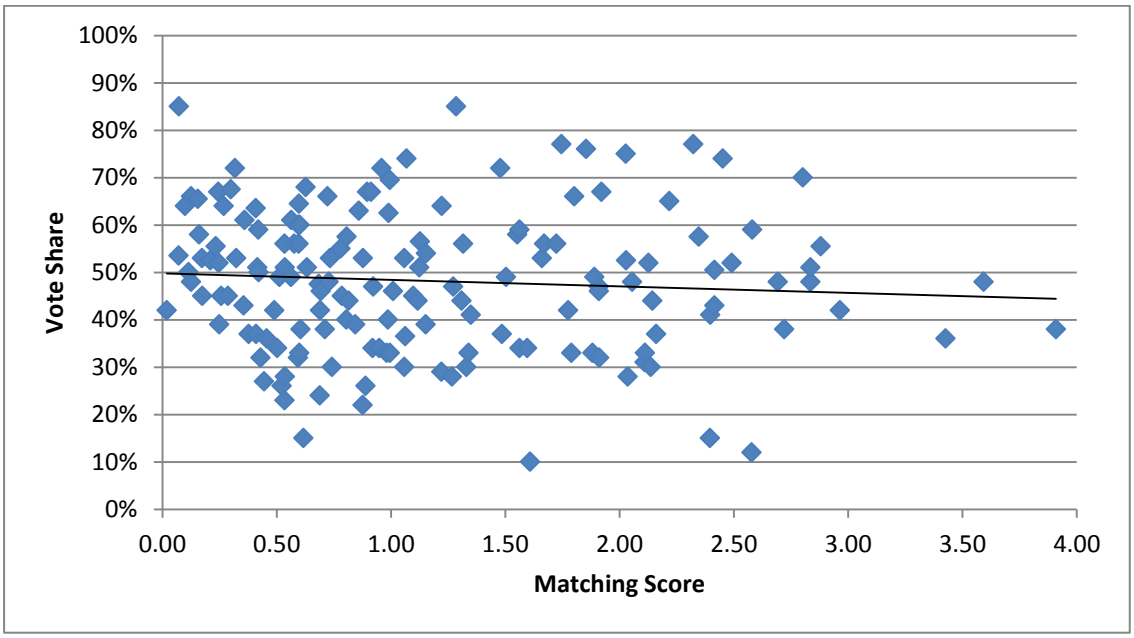


Figure 34. The correlation between candidates' matching score and vote share.

Although this result did not support a general relationship between name-face congruency and vote-share, and was inconsistent with the results from Study 4, which found liking increased for faces which were named congruently, it did raise certain questions related to the sample distribution. For instance, Study 4 used stimuli that were extreme, by design, in terms of their name-face congruity (congruent $M = 0.29$, $SD = 0.20$, versus incongruent $M = 1.95$, $SD = 0.46$) and were distributed bimodally. Thus, it is possible that only highly (mis)matching name-face pairs elicit emotional responses and influence judgment. To test this more limited hypothesis, extreme exemplars in the candidate pool were identified as those whose matching scores which were either equal to or were above ($M = 1.95$; N = 31) and below ($M = 0.29$; N = 19) the mean average matching score for the groups used in Study 4. An independent samples *t*-test showed that the vote share obtained by these two extreme groups differed significantly, $t(48) = 2.04$, $p = .047$, with congruently-named candidates earning a greater proportion of votes ($M = 0.55$, $SD = 0.11$) than incongruently-named candidates ($M = 0.47$, $SD = 0.16$). Candidates who were congruently-named earned eight more percentage points compared to candidates who were incongruently-named.

Discussion

The laboratory studies reported in this thesis have shown consistent, albeit small, bi-directional relations between name-face congruence and positive judgments, suggesting that the two variables are associated in people's minds. If so, aside from any causal influence of naming on liking, we should be able to use congruency to predict positive judgments in the "real world". The current study tested this idea in the political arena, as politicians may be particularly susceptible to the consequences of an ill-fitting name. Voters can make snap decisions based on very little information about politicians, and these rapid judgements have the power to shape the outcome of elections usually determining who will win or lose purely on facial characteristics (Antonakis & Dalgas, 2009; Ballew & Todorov, 2007; Olivola &

Todorov, 2010; Todorov et al., 2005; Willis & Todorov, 2006). The aim of this study was to measure if politicians who had higher name-face congruency gained more votes than those with lower face-name congruency.

The results showed that overall the correlation between candidates vote share and name-face congruency was negative – consistent with the hypothesis that mismatched politicians would perform more poorly in elections – but nonsignificant. However, when only extreme matches and mismatches were considered, there was a significant difference: politicians with particularly bad face-name congruency were at a disadvantage and had a lower proportion of the vote share (M = 47%), compared to politicians with good name-face congruency (M = 55%). The result is consistent with previous findings from Study 4, that people with congruent names are perceived more positively, and furthermore, that this positivity is related to actual political success.

The effects of congruency, as in all the studies in this thesis, were small, and furthermore only occurred in the case of relatively extreme (mis)matches. It is important to note, however, that small effects are the norm in many political races, which are often decided on very small margins (Friedman, 2015). For example, since the last uncontested election in the United States of America in 1820, almost no president has been elected with more than an 60% vote share (the only notable exceptions have been Warren G. Harding (1920), Franklin D. Roosevelt (1936), Lyndon B. Johnson (1963), and Richard Nixon (1972) who all gained just over 60%) (Friedman, 2015). In the 2012 presidential election, Barack Obama won with 51% of the popular vote, compared to Mitt Romney's 47%. Thus, a differential of eight percentage points, the difference in the current study between candidates with extremely well and ill-fitting names, is a meaningful effect.

Given the moderating effects of positivity on congruency (Chapter 6), it is worth considering whether the results would be even larger if "politicians" were not a generally

negative group. In Australia, it is argued, politicians have always been looked at with either bemusement, apathy, or disapproval (Goot, 2002). Comparable data between the period 1964-86 for Norway, Sweden and the United States has shown that the public's trust in its political sector has had a continuous downward trajectory (which later recovered in Norway). Newton and Norris (2000) found, based on data from world values surveys for 17 nations during the time periods 1980-1984 and 1990-1993, that confidence in public institutions has suffered significant decline in general. In the United States, from which the candidates in Study 8 come, confidence in political institutions reached record or near record lows in 2012, according to the nationally representative General Social Survey of Adults (1972–2012; N = 37,493) and the nationally representative Monitoring the Future survey of 12th graders (1976–2012; N = 101,633), (Twenge, Campbell, & Carter, 2014). To the extent that politicians are a negative group, the studies in Chapter 6 suggest that the association between congruent naming and positivity should be attenuated (or even reversed). In this context, the fact that any relationship emerged at all attests to the strength of the congruency effect (at least in extreme cases), and suggests that it may be more influential in more positive contexts (e.g., a school board, rather than a senatorial election).

Once again, is not clear whether the association between congruency and vote share is direct, or mediated by another variable. Other studies have also shown similar associations using other predictors. Several studies claim that vote share is a function of how "competent" a politician looks (Ballew & Todorov, 2007; Todorov et al., 2005), or how attractive they are (Rosar et al., 2008). In a particularly relevant study (Olivola et al., 2012), researchers found that in conservative electorates, candidates who looked stereotypically "Republican" fared better than their rivals, but the same effect was not found in liberal states. Interestingly, vote share has also been shown to increase for politicians whose faces have been morphed with

voters own faces (Bailenson et al., 2008), another example of "fit" predicting electoral success.

However, voters tend to agree that competence is the most important trait a politician should possess (Abelson, Kinder, Peters, & Fiske, 1982). Furthermore, competence ratings can be made very rapidly, in less than 100ms, and once made are not likely to change much when additional information is provided (Willis & Todorov, 2006). These findings suggest that people extract information about competence from faces very rapidly, and that these judgements are predominantly unreflective and intuitive, "System I" processes (Kahneman, 2003). Furthermore, it is noteworthy that competence was among the traits related to congruence in Study 2b (Chapter 4). Therefore, an effect of congruence on competence would be consistent with a host of other variables influencing this important trait. For instance, one study found wearing makeup can increase (amongst other things) people's perceptions of a woman's competence (Etcoff, Stock, Haley, Vickery, & House, 2011). Another study found that people who seek advice on solving difficult problems were perceived as more competent than those who chose not to seek advice (Brooks, Gino, & Schweitzer, 2015). Other researchers have found that men with wider faces appear more competent, though also more aggressive and deceitful (Haselhuhn, Wong, Ormiston, Inesi, & Galinsky, 2014). Congruence between a person's name and face may be another factor that can influence the perception of competence (and concomitantly increase vote-share in the case of politicians). The implication of this is that a politicians' name-face match may influence how competent they look to voters, and consequently their vote share.

An important remaining question, of course, is how congruency *causally* relates to electoral success, if at all. One possibility is that the general effect of congruency moderates liking for the candidate, as discussed in Chapter 5. Furthermore candidates who have good name-face congruency may also get processed more fluently, which consequently increases

liking for them (Reber et al., 2004). Equally important in the context of elections, fluent information may be easier to learn and recall. This notion is supported by another study which explored if ideally matched face-name pairs would be easier to learn than pairs which were not ideally matched. The researchers found that participants found it easier to learn name-face pairs which were well-matched compared to those which were poorly-matched (Lea et al., 2007). Hence, a politician with good name-face congruency might be rated more positively because his name is easier to learn and remember, with the benefit to voters being that they require less cognitive effort to think about him. These factors could play an important role in candidates gaining votes in an election campaign.

The most interesting possibility, from the perspective of the current thesis, is that voters themselves base their judgments partially on name-face congruency, either directly or via inferences of competence or another trait. This effect would be consistent with the causal effect of congruency demonstrated most persuasively in Study 4, where learning that a person's name was congruent improved liking for them (and presumably other positive judgments). At this point, however, such causal inferences are only speculative; it is too early to advise politicians to change their name to improve performance at the polls.

Chapter 8: Overview and conclusions

This thesis was undertaken to explore the relationship between people's names and their faces. It was inspired from studies on the "bouba-kiki" effect, which show a sound-symbolic relationship between the names of objects and their physical shapes. Previous research has found that people were more likely to associate names to objects that had a more congruent sound-symbolic relationship. Hence the first aim of this thesis was to determine if the bouba-kiki effect existed in the social domain. Furthermore, a social bouba-kiki effect may have unique affective implications: objects don't care about their names, whereas people do. Hence the second aim of the thesis was to determine if the level of congruency between a person's name and their face had any affective significance. The final aim of the thesis was to investigate name-face congruency in the real world and determine if there is any actual evidence of name-face congruency playing a role in an individual's success or failure.

To answer the first research question, two studies (Study 1a and 1b) explored whether the bouba-kiki effect existed in faces. Results using a sample of caricatures, and in a second study, a sample of real faces, clearly showed that it did. Participants ranked "round" names (names which predominantly contain round vowels /o/ and /u/) as significantly better fits for round faces (Faces with a wide chin angle +/- 100°)[12]. Studies 2a and 2b replicated these effects, and also showed that congruency was associated with positivity (research question 2): congruently-named people were liked more and rated more positively on other positive social dimensions compared to incongruently-named people.

However, there are two (not mutually exclusive) explanations of the congruency-positivity relationship, and both were explored in turn in Studies 3-7. In Studies 3 and 4, I tested the hypothesis that congruent names produced greater liking. In Study 3, participants were forced to name faces with either congruent or incongruent names. The results showed

[12] The procedure of quantifying and verifying these variable descriptions is more fully covered in Chapter 2.

no significant naming differences between congruent and incongruent faces, possibly because the naming task did not effectively violate participants' expectations of name-face congruency. Hence, there were several methodological issues with this study which Study 4 was designed to resolve. In Study 4, participants rated how much they liked faces before and after they found out the person's name. The results showed that liking increased more for targets which had congruent names, than for those with incongruent names. In fact, for spiky faces, liking decreased for those with incongruent names. The liking difference between the congruent and incongruent ratings was also significant. Hence these studies supported the notion that congruency increased liking.

However there was also a reverse causal path, that faces would be assigned congruent names *because* they were liked. Studies 5 – 7 explored the hypothesis that faces which were liked more would be named more congruently. To test this, three studies were devised to manipulate liking. In Study 5, liking was manipulated by means of social category (Breckler et al., 2005). Participants were asked to assign names to firefighters, child molesters or control faces. I expected firefighters to be named more congruently than child molesters as fire fighters are viewed more positively than child molesters. The results showed that indeed firefighters (spiky, but not round) were named more congruently than child molesters, although control faces were named more congruently overall.

As the results from Study 5 were not particularly strong or convincing, Study 6 was undertaken to further explore the hypothesis that initial liking would lead to greater congruent naming. Instead of social categorisation, this study employed a manipulation of liking which has been shown to be particularly effective: attractiveness (Dion et al., 1972). I expected attractive faces to be liked more than unattractive faces and therefore to be named more congruently. Indeed the results supported this hypothesis as both spiky and round attractive faces were named significantly more congruently than unattractive round and spiky faces.

In the final study, liking was manipulated via facial expression. The prediction was that participants would name smiling faces more congruently than neutral faces because smiling faces are more likeable (Lau, 1982). The results showed once again, for both round and spiky faces, the more likeable faces (smiling) were named significantly more congruently than neutral faces. Hence, the studies from Chapter 6 all supported the idea that people, who are more likeable, for one reason or another, are also named more congruently.

Finally, the third part of the thesis explored whether the social bouba-kiki effect and its affective associations had any real-world implications (Study 8). I examined a sample of political candidates and the impact their name-face congruency had on their vote share. I expected that name-face congruency would be positively related to vote share. The results showed that vote-share was associated with name-face congruency, but only when the fit was relatively extreme. Political candidates who had a high level of name-face congruency received a significantly greater proportion of votes than candidates whose congruency was particularly low. Hence in extreme cases, the level of a candidates' name-face congruency can have a measurable effect on his vote share.

The findings from this thesis are mainly applicable to relatively extreme cases of name-face (in)congruency. Because the studies were in part an "existence proof" of the social bouba-kiki effect, all experiments used particularly round and spiky faces to maximize the power of the tests. Hence the face-name congruency effect may not be as pronounced in people with more neutral face shapes. The studies also used exclusively male faces in order to minimize error variance due to gender. Future research will need to explore the boundary conditions of the effect by including more average faces and names of both males and females, and by manipulating the conditions under which judgment takes place.

There may be other factors which influence congruency between a name and a face, which were not explored in this thesis. One such factor which warrants further examination

relates to the fundamental frequencies of names. Research has shown that vowels have varying fundamental frequencies such that certain vowels produce low tones while others produce higher tones (Pena et al., 2011). Research has also shown that these tones are sound symbolic in nature as people are more inclined to associate low tone with larger, wider objects, and higher tones to smaller, thinner objects (Sapir, 1929a). By measuring the fundamental frequencies of names, we can examine whether names with low fundamental frequencies are more associated more with larger – rounded faces and names with higher tones with spikier thinner faces. In doing this, we may show that there are other types of associations which influence the name-face congruency effect. This may be easily accomplished using the data from the current studies reported in this thesis, as we already have the names which were more heavily associated with different face shapes. What is lacking in the data is a frequency measurement for each name, which may be obtained from existing data sets or measured with software. The hypothesis would be that low frequency names will be more congruent with big faces and high frequency names with small faces. From this study, it might be possible to demonstrate other forms of congruency between names and faces.

Other areas of congruence may lie in the implicit associations that certain names have. For example, there are stereotypically black and white names (Bertrand & Mullainathan, 2004), names associated with juvenile criminals (Kalist & Lee, 2009), names commonly given to girls (Figlio, 2007), attractive and unattractive names (Erwin, 1993; Garwood et al., 1980), and popular and unpopular names (Kalist & Lee, 2009). Hence there may be certain names more congruent with certain individual characteristics, such that well-fitting names produce positive associations. For example, name-face congruence aside, politicians who are judged as more competent (Ballew & Todorov, 2007; Olivola & Todorov, 2010; Todorov et al., 2005) may fare better if they possess a “competent” name. Alternatively, politicians in

general may be judged more positively when they possess a competent name because of the congruence between the name and the traits associated with their profession.

Other sources of congruency might extend beyond names. For example, congruence between a person's body or face shape and the pitch of their voice could have implications for judgment. People who are long and skinny, but who are paired with baritone voices may be liked significantly less than people who are long and skinny paired with Tenor or Alto voices.

There may even be congruence factors with people with different coloured clothing: dark colours may be more associated more with deeper voices and lighter clothing with higher voice pitch. There may be effects regarding hairstyles and clothing, with some hair styles being judged more congruent with certain clothes. Hence, the effects of congruency will most likely extend well beyond the scope of names and faces.

Applications

In general it appears that, at least in the laboratory, learning that a person has a congruent name can lead to more positive evaluations of him or her; and conversely, likeable people will be presumed to have more congruent names. The results of Study 8 suggest that, at least in principle, congruent naming could influence the outcome of an election. Are there other applications of this work?

Naming Babies

Given the "naming" paradigm used in many of the current studies, a natural place to look for applications is in the one domain most associated with name choices: baby naming. Choosing names for children can be an important decision, especially when considering the many negative consequences which may plague children later on in life if they have a "bad", or ill-fitting names (Figlio, 2007; Kalist & Lee, 2009). Pamela and Rosenkrantz (2004), claim

that parents believe their child's name holds power to shape their self-esteem and affect their future. Parents think their child's name can mould their identity and influence how they are seen and treated by others. Research has found an association between names and social characteristics. For example, in some first names, the name holder is judged as less intelligent or less popular than is actually the case (Mehrabian, 2001).

Unsurprisingly, parents do not name their children arbitrarily. In a study examining 325 million names of children born since 1880, researchers found that just nine per cent of boys born in 2007 were given a "top 10" name, compared with 32 per cent in 1955. For girls this figure was eight per cent in 2007, compared to 22 per cent in 1955 (Twenge, Abebe, & Campbell, 2010). The conclusion was that parents are putting more thought into naming their children, which may be due to society's increasing emphasis on individualism (Myers, 2001; Seligman, 1990), or perhaps parents' desire to break away from the stereotypes associated with many of the names from the past. In any case, when naming children, parents may do so non-arbitrarily and if so, then some names will be seen as more appropriate than others.

The findings from this thesis suggest that parents could consider the relationship between the shape of the child's face and potential names. Obviously, to use this method, it would help to know what the child will eventually look like when they are older. One way to resolve this dilemma would be to estimate what the child's face shape will eventually take by averaging both parents' face shapes, as genetics should provide a reasonable clue of what the child's will eventually look like (Maes, Neale, & Eaves, 1997). If the average of parents face-shapes is round then the child may benefit from a rounder name. Having a congruent name which is a better fit with the child's face might give him or her a better start in life.

Alias or Nick Names

Other than at birth, there are limited opportunities to choose names, however name changes are more common among people in the public spotlight. For example, it is quite common for actors to change their names or choose a stage name. It may be useful for these professionals to choose a name with is more consistent with their face as this could improve their rankings with fans or land them that important role in an upcoming blockbuster. Even "regular" people may choose to go by different versions of their names (i.e., nicknames), and name-face congruency could be an informative tool in doing so.

Many movie actors and musicians change their names, and a good example of one who did so, and who evidently also chose a more congruent name is Reginald Kenneth Dwight (born 25 March 1947), but who today is better known as Elton John (Buckley, 2007). Using the objective measures explained in Chapter 2, Reginald Kenneth Dwight would score 1.17 (a more spiky name), whereas Elton John scores 2.30 (a rounder name). Taking a lower face angle for Elton John we get a value of 91° from his photograph in Figure 35. Subjective ratings of face shape reported in Chapter 2 suggest that people with lower face angles of 91° had an approximate subjective measure of 5.84; hence using this value we calculate name-face matching scores of 3.55 for Reginald Kenneth Dwight and 2.54 for Elton John, indicating that the latter name is more congruent and a better fit than his original name. Of course, this does not imply that Elton John became successful because he changed his name, but it is possible that the improvement he experienced in name-face congruency had an additive effect on his success.

Figure 35. Elton John (Buckley, 2007)

Character naming in books or movies

Another potential application of the current work is for the way characters are named in books and movies. Of course, many characters are named symbolically to convey positive or negative associations. For example, in the popular movie series “Star Wars”, the most destructive weapon in the galaxy is called the “Death Star”. The word death is often associated with negative emotions (Black, 1977), hence it appears that the name “Death Star” is meant to capture a sense of negativity. Contrast this to the heroes in Star Wars, “Luke Skywalker”, whose name captures a more positive emotion, as the name Luke means “light”. It seems reasonable to suggest that the producers of the “Star Wars” enterprise may have named their characters to exemplify certain qualities; such as “death” or “light”, and in so doing create certain affective responses towards these people or objects. In the “Star Wars” movies, these associations appear to be effective, but may lack a formal method. Considering name-face congruency may be a useful method character creators could use when thinking about names for their characters.

Indeed, congruency may already have been put to use. One particular villain who captures the effectiveness of applying name-face congruency is the master villain “Lord Voldemort” (Figure 36) from the popular movie series “Harry Potter” (Rowling, 2014). Lord Voldemort has a particularly angular face (see chin angle), but his name is mostly round as it has mainly the rounded /o/ vowel. This makes his face-name association non-sound symbolic (incongruent). For a villain, his name is a good match because it is incongruent with his face which should create a more negative response in viewers. Conceivably, villains can be made more villainous if their names are given careful consideration and made not to match their face particularly well.

Figure 36. Lord Voldemort in Harry Potter and the Philosopher's Stone (Rowling, Cleese, Coltrane, & Davis, 2002).

In comparison, consider a popular hero amongst children, Kung Fu Panda. His name “Po” is particularly well matched to his face, because it contains the /o/ vowel which rounds the lips, thus making it congruent with his round face (Figure 37). The congruency between his name and face will most likely activate the appropriate affective response in viewers which is most likely the original intention of the creators of the hero.

Figure 37. Po, the hero from Kung Fu Panda (Dreamworks, 2015).

Theoretical Implications and Future Research Opportunities

Non-Arbitrariness of language

Mainstream linguistics has consistently denied any systematic relationship between words and the objects they refer to (De Saussure, 2011; Gasser, 2004). However the research presented in this thesis (see Study 1a and 1b), and in conjunction with general bouba-kiki research (Bremner et al., 2013; Holland & Wertheimer, 1964; Kohler, 1947; Maurer et al., 2006; Ramachandran & Hubbard, 2001), suggests an alternative account, at least under certain controlled, experimental conditions. In the two naming studies presented earlier on in the thesis (Study 1a and 1b) we find an alternative account to an arbitrary naming hypothesis, and discover that in some situations, names are more than just random labels used to name referents.

Consequently, language development may occur under far more systematic and deliberate processes that pervious assumed. At least, Rendall and Owren (2010) argue that vocalizations are non-arbitrary and may confer a survival advantage, observing that animals

in the wild use a style of communication consistent with their current predicament. In human infants we also notice that their communication style develops from birth in a manner consistent with their current predicament; i.e. crying to elicit a parental response for feeding or to change a wet nappy. Hence, at least in some instances, it is reasonable to suggest that from birth we develop language in a more systematic and deliberate manner, rather than randomly. However, a more pertinent consideration is whether people use a non-arbitrary process to name others and whether this process develops early on. Although my research did not directly examine the social bouba-kiki effect in very young children, it is plausible that a similar non-arbitrary naming effect between names and faces will be observed in the very young. This notion is reasonable to expect because bouba-kiki researchers have found the effect of mapping non-words to shapes is already evident in very young children (Maurer et al., 2006; Ozturk et al., 2013), and as my findings build on previous research with shapes and non-words, I would expect a similar outcome regarding faces and names.

One reason why we might find the naming effect to be a function of early language development is due to the way infants learn associations between words and objects. For example, Ramachandran and Hubbard (2001), suggest that the effect may arise from cortical associations between the visual perception of shape, observation of the shape of the speaker's lips, and feeling the tongue's inflection and movement when saying or mimicking the word. For example an infant might see his father holding a spoon, who then says "spoon", rounding his lips as he says the word. The infant consequently mirrors the sound and feels the inflection of his tongue in his own mouth, at the same time associating the roundness of his father's lips to the round shape of the spoon. Thus he connects neurologically the various components which cause the sound symbolic association between objects and their names. This example illustrates how related concepts of roundness become associated cognitively, and possibly why we notice the tendency in the adult participants from my experiments who

matched similarly shaped names to faces, because this is how they learnt to associated concepts earlier on in their development. Future research may attempt to examine the social bouba-kiki effect in very young children with the aim of exploring if language development follows a random, arbitrary course of development, or if it is more systematic and deliberate. If language development is indeed non-arbitrary, then we should expect to find very young children following a similar name-face matching process to that observed in adults.

Our Names Have Social Implications

Our names have important social implications which can shape our futures. For instance, some first names can result in the name holder been judged as less intelligent or popular than is actually the case (Mehrabian, 2001), having a minority name can lead to less favourable personality judgements (Banaji & Hardin, 1996), certain names lead to more workplace bias (Bertrand & Mullainathan, 2002), name-based discrimination can occur early in school life (Anderson-Clark, Green, & Henley, 2008), boys given girl names are more prone to misbehaviour as they grow older (Figlio, 2007), juvenile males with unpopular, uncommon or feminine names are more likely to get into trouble with the law (Kalist et al., 2015), and girls are rated as being more attractive when given desirable names as opposed to undesirable names (Garwood et al., 1980). Hence names are not arbitrary labels incapable of arousing certain positive or negative judgements.

The examples above illustrate that there are many factors which can shape others judgements about the name holder. The current research introduces another factor, which relates to the congruency between the shape of the person's name and their face, with the added implication being that a person with a name which is congruent with the shape of their face is liked more than when their name is incongruent. Albeit, this appears to be more pronounced if the fit is particularly (mis)matched as the study on political success (Study 8) suggests. The politicians in this study who had an average match, appeared to be relatively

unaffected by the relationship between their name and face. However, in the more extreme cases, the effects were more pronounced. When the focus was placed on candidates who had particularly good and bad name-face matches there was a significant difference in vote share (up to 10%). Granted there may have been other factors which affected their vote share (other than name-face congruency), but at least to some degree, the results of Study 8 demonstrate that a person's name-face match is not an arbitrary factor which can be easily dismissed as irrelevant.

Sound Symbolism

One way to account for the existence of a non-arbitrary naming convention is through sound symbolism; which is defined as the association between specific speech sounds and the particular stimuli they symbolise (Spence, 2011).

In this thesis, sound symbolism referred to the association between the shape of a name and the physical characteristics of a face. As I demonstrated in Chapter 2, both names and faces can be quantified in terms of shape, as both can be objectively and subjectively measured in terms of their respective roundedness. In Chapter 3, my primary hypothesis was that names would be associated with faces with a similar shape, because for example, when a name is vocalised the lips take on a certain shape, and this in turn symbolises a face with a comparable shape. The results showed that indeed people were more likely to name a face with a congruent name, than the alternative, supporting the mechanism of sound-symbolism.

Hence, round names symbolised round faces in perceivers minds. Possibly a round name activates certain expectations regarding the physical attributes of the face, like the lower face angle for example; hence "Bob" a round name activates an expectation of a face with a round lower face angle.

In the studies reported in this thesis, faces were objectively rated on their lower face angles, but there may also be other physical dimensions other than lower face angle which are

more strongly associated with certain names. I expect that future research may find other associations which might account more for the effect than lower face angles. It may be that a single feature is more salient, or a combination of several. For instance, in several studies reported in this thesis (e.g. Study 1b, 2a and 2b) there were a minority of faces which were named more incongruently. However, based on their lower face angles, I expected these incongruently named faces to be named congruently. Hence, there may have been other physical attributes of the face which contributed more to those faces being perceived as round or spiky than expected. For instance, people may have attended more to hair style than lower face angle, or the roundness of the lips. For example, round faces with spiky hair may have appeared subjectively more spikier than round. Hence, future research opportunities lie in the investigation of physical attributes of faces which are more salient and potentially more associated with naming.

Expectations and liking

General research on expectancies demonstrate that when people have their expectations met, it usually results in more positive affect, or an increase in certain behaviours (Killen et al., 1996; Michie et al., 1997; Williams et al., 1995). At the heart of sound symbolism is the notion that a sound symbolises a certain shape in a person's mind. Hence, simply thinking about a name might raise certain expectations about a corresponding face-shape. When this expectation is met, a person is liked more, because we like it more when our expectations are met (Killen et al., 1996; Michie et al., 1997; Williams et al., 1995). For instance, consumers like sparking water more when it comes in a shape congruent bottle, or has a shape congruent label (Deroy & Valentin, 2011; Spence, 2011). Likewise, observers like targets more when their face meets expectations of what the targets face should look like. This idea is supported by Study 4 which demonstrated how participants changed their liking for faces which had congruent-names, and decreased it for faces which had incongruent-

names (particularly spiky faces). It appears then that when faces met participants name-face shape *expectations*, positivity increased as they *expected* faces to have congruent names rather than incongruent alternatives. Hence congruency, be it via name-face shape congruency, or some other type of congruency, may be a factor of our expectancies, and we may be biased towards congruency far more than incongruency.

Congruency

The effects of congruency on affect have been well documented and the general finding is that more positivity ensues as a result of congruency (de Droog et al., 2012; Maurer & Tindall, 1983; Maxwell & Cook, 1985; Mitchell et al., 1995; Spangenberg et al., 2006; Trout & Rosenfeld, 1980; Walker-Andrews & Grolnick, 1983). The findings in this thesis, particularly from Study 4, are that people prefer congruency between targets names and faces, and that name-face congruency has important social implications.

In Study 4, congruently-named people enjoyed an affective benefit of increased liking. Though the effect was small, it could still have serious real world implications. For instance in a job interview, a slight difference in liking between applicants, created through the difference in congruency between applicants names and faces, could result in one applicant getting hired and the other losing out. A small difference could produce a big effect. This idea is not entirely without precedent, as Bertrand and Mullainathan (2004), found that job applications labelled with White sounding names where far more successful in getting a job interview than those labelled with Black sounding names. The small difference between applications was the name alone, but this small difference had serious implications. Hence congruency between a person’s name and face may be as important a consideration as other aspects of the name holder, and that the small difference it produces in outcomes may have meaningful implications.

In this thesis I investigated only one type of congruency, namely name-face shape congruency, but there may also be several other types of congruencies which play an equal or even more important role in determining the fit between a person's name and their face. These could include fundamental frequencies of names and how well they fit the physical qualities of a face, the congruency between a person's culture and their name, the congruency between the age of the person and the perceptual contemporariness of their name, and the sharpness or smoothness of their name and how well they match the sharpness or smoothness of their face.

For example, researchers have found low back vowels |o| and |u| are consistently matched to larger objects and high back vowels |i| and |e| to smaller objects (Sapir, 1929a). Whalen and Levitt (1995) have also found high front vowels |i| and |e| to have higher fundamental frequencies compared to low back vowels |o| and |u|. In the real world, objects which are thinner or smaller, like violins, tend to produce higher pitch sounds than larger, wider objects like Cellos which produce far lower sounds. Hence there may be a strong association between the fundamental frequencies of names and the physical characteristics of faces. This relationship between sound dynamics and physical shape, is possibly another congruency which people intuitively attend to and which has important contributions to the naming effect.

Future research could investigate these alternative congruencies further. It is true that in Study 8 on political success, that other types of congruencies between candidates' names and faces may have contributed to the variance more or less than name-face shape congruency. Hence, it may be important to distinguish between other types of congruencies to determine more conclusively the actual contribution of name-face shape congruency.

Processing Fluency

In a related study by Lea et al. (2007), name-face pairs were easier to learn when their names were well-matched compared to when they were poorly-matched. One explanation offered was that there was a cross-modal interaction between the sound of the name and the physical features of the face. When articulating the name, the acoustic features of the sound were integrated into the physical features of the face and via versa. The researchers postulated that “Bob”, for example, is an acoustically rounded name which suggested roundness, and thus symbolised roundness of the face (Sapir, 1929b). However, no data were presented to substantiate this mechanism. In this thesis I postulated that a possible mechanism is processing fluency.

Processing difficulty, also known as “fluency” provides a suitable mechanism by which affect can “attach” to congruent stimuli. According to Reber et al. (2004) if an object can be perceived with ease, this cognitive ease of processing or fluency of the object results in greater liking for it. This and other research (for further reviews see (Alter & Oppenheimer, 2009) demonstrate how people rate more positively what they experience as fluent or what they can perceive with greater fluency. Hence, fluency can influence our experience of liking through acting on our subjective feelings which accompany the perceptual process. Forster, Leder, and Ansorge (2013) found that images which were objectively more fluent were judged as more fluent and also liked more. My contention is similar to what they found, in that faces which are objectively more fluent (have a high level of name-face congruency) are liked more.

When faces are congruently-named, it leads to easier cognitive processing, and this leaves us feeling more positive. Another aspect is that congruently-named faces are easier to learn and remember, which once again leads to more positive affect. Hence, the resultant workload required to process congruently-named faces is lighter than the incongruent alternative.

Although my research did not directly test aspects of fluency, we could do so in future research. For instance to test both the memory advantage and the increase in processing speed, we could devise an experiment which does both at the same time.

Using a response time paradigm, I will initially teach participants the names of a certain number of congruently-named and incongruently-named faces. Following this I will measure participants repose times in a sequential stimulus presentation task, where participants will be presented with learnt stimuli and non-human faces (like animals, or emoticons) and asked to respond when they see the real faces appear onscreen. My hypothesis is that participants will respond faster to congruently- named faces than to incongruently- named faces. The reason for this is that, (1) theoretically congruently-named faces will be easier to learn due to the effects of processing fluency, and (2) congruently-named faces will be faster to process, because increased congruency between name and face, leads to greater processing fluency. This research will be an important next step with regards to uncovering some of the underlying mechanisms potentially responsible for the social bouba-kiki effects reported in this thesis.

Conclusion

This thesis was undertaken to explore the relationship between people's names and their faces. The results showed that the bouba-kiki effect extended to faces and that people who were congruently named were rated more positively – and vice versa. This may be useful information to know when choosing suitable names, whether for ourselves, our children, or other things we care about (e.g., our pets). Although understanding the extent of names' influence and the psychological mechanisms of that influence, requires far more research, it is clear that names are not arbitrary labels. They carry affective implications in themselves, but according to the current research, also affective implications in relation to the things they denote. Having a name that fits –particularly if it fits very well – may be as

important as having a name that connotes positivity. For the politicians who had a measurably good name this may have been a decisive factor in their victory. Even for “regular” people, names carry important affective consequences, which suggests that before we decide what name to assign to another, we should consider the impact that name will have on his or her future.

References

Abelson, R. P., Kinder, D. R., Peters, M. D., & Fiske, S. T. (1982). Affective and semantic components in political person perception. *Journal of Personality and Social Psychology, 42*(4), 619.

Alter, A. L., & Oppenheimer, D. M. (2009). Uniting the tribes of fluency to form a metacognitive nation. *Personality and Social Psychology Review, 13*(3), 219-235. doi:10.1177/1088868309341564

Antonakis, J., & Dalgas, O. (2009). Predicting elections: Child's play! *Science, 323*(5918), 1183-1183. doi:DOI 10.1126/science.1167748

Babynamewizard.com. (2015). The top 1000 baby names of 2013, United States of America Retrieved from http://www.babynamewizard.com/the-top-1000-baby-names-of-2013-united-states-of-america

Bailenson, J. N., Iyengar, S., Yee, N., & Collins, N. A. (2008). Facial similarity between voters and candidates causes influence. *Public Opinion Quarterly, 72*(5), 935-961.

Ballew, C. C., & Todorov, A. (2007). Predicting political elections from rapid and unreflective face judgments. *Proceedings of the National Academy of Sciences of the United States of America, 104*(46), 17948-17953. doi:DOI 10.1073/pnas.0705435104

Banaji, M. R., Hardin, C., & Rothman, A. J. (1993). Implicit stereotyping in person judgment. *Journal of Personality and Social Psychology, 65*(2), 272-281. doi:Doi 10.1037/0022-3514.65.2.272

Banaji, M. R., & Hardin, C. D. (1996). Automatic stereotyping. *Psychol Sci, 7*(3), 136-141. doi:DOI 10.1111/j.1467-9280.1996.tb00346.x

Baron, R. A., Byrne, D., & Branscombe, N. R. (2006). Social Psychology *Aufl., Boston*.

Bertrand, M., & Mullainathan, S. (2004). Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination. *American Economic Review, 94*(4), 991-1013. doi:doi: 10.1257/0002828042002561

Billig, M., & Tajfel, H. (1973). Social categorization and similarity in intergroup behaviour. *European Journal of Social Psychology, 3*(1), 27-52.

Black, P. M. (1977). Three definitions of death. *The Monist, 60*(1), 136-146.

Bone, P. F., & Jantrania, S. (1992). Olfaction as a cue for product quality. *Marketing letters, 3*(3), 289-296.

Bono, J. E., & Judge, T. A. (2004). Personality and transformational and transactional leadership: a meta-analysis. *Journal of Applied Psychology, 89*(5), 901.

Breckler, S., Olson, J., & Wiggins, E. (2005). *Social psychology alive*: Cengage Learning.

Bredin, H. (1996). Onomatopoeia as a figure and a linguistic principle. *New Literary History, 27*(3), 555-569.

Bremner, A. J., Caparos, S., Davidoff, J., de Fockert, J., Linnell, K. J., & Spence, C. (2013). "Bouba" and "Kiki" in Namibia? A remote culture make similar shape-sound matches, but different shape-taste matches to Westerners. *Cognition, 126*(2), 165-172. doi:10.1016/j.cognition.2012.09.007

Brooks, A. W., Gino, F., & Schweitzer, M. E. (2015). Smart people ask for (my) advice: Seeking advice boosts perceptions of competence. *Management Science*.

Buckley, D. (2007). *Elton: the biography*: Chicago Review Press.

Butcher, K. M. (2004). Determining which personality traits predict gpa best in middle and high school students at anderson county schools.

Carney, D. R., Colvin, C. R., & Hall, J. A. (2007). A thin slice perspective on the accuracy of first impressions. *Journal of Research in Personality, 41*(5), 1054-1072.

Cash, T. F., Gillen, B., & Burns, D. S. (1977). Sexism and beautyism in personnel consultant decision making. *Journal of Applied Psychology, 62*(3), 301.

Chandrashekar, J., Yarmolinsky, D., von Buchholtz, L., Oka, Y., Sly, W., Ryba, N. J. P., & Zuker, C. S. (2009). The taste of carbonation. *Science, 326*(5951), 443-445. doi:DOI 10.1126/science.1174601

Clifford, M. M., & Walster, E. (1973). The effect of physical attractiveness on teacher expectations. *Sociology of education*, 248-258.

Cotton, J. L., O'neill, B. S., & Griffin, A. (2008). The “name game”: affective and hiring reactions to first names. *Journal of Managerial Psychology, 23*(1), 18-39.

Cottrell, C. A., & Neuberg, S. L. (2005). Different emotional reactions to different groups: a sociofunctional threat-based approach to" prejudice". *Journal of Personality and Social Psychology, 88*(5), 770.

Crandall, C. S., Eshleman, A., & O'Brien, L. (2002). Social norms and the expression and suppression of prejudice: the struggle for internalization. *Journal of Personality and Social Psychology, 82*(3), 359.

Crystal, D. (2004). *The Cambridge encyclopedia of the English language*: Ernst Klett Sprachen.

D'Onofrio, A. (2014). Phonetic detail and dimensionality in sound-shape correspondences: refining the bouba-kiki paradigm. *Lang Speech, 57*(3), 367-393. doi:Doi 10.1177/0023830913507694

De Anda, D. (2001). A qualitative evaluation of a mentor program for at-risk youth: The participants' perspective. *Child and Adolescent Social Work Journal, 18*(2), 97-117.

de Droog, S. M., Buijzen, M., & Valkenburg, P. M. (2012). Use a rabbit or a rhino to sell a carrot? The effect of character–product congruence on children's liking of healthy foods. *Journal of Health Communication, 17*(9), 1068-1080.

De Gelder, B., & Vroomen, J. (2000). The perception of emotions by ear and by eye. *Cognition & Emotion, 14*(3), 289-311.

De Saussure, F. (2011). *Course in general linguistics*: Columbia University Press.

DeCarlo, D., Metaxas, D., & Stone, M. (1998). *An anthropometric face model using variational techniques.* Paper presented at the Proceedings of the 25th annual conference on Computer graphics and interactive techniques.

Deliza, R., MacFie, H., & Hedderley, D. (2003). Use of computer-generated images and conjoint analysis to investigate sensory expectations. *Journal of Sensory Studies, 18*(6), 465-486. doi:DOI 10.1111/j.1745-459X.2003.tb00401.x

Deroy, O., & Valentin, D. (2011). Tasting liquid shapes: investigating the sensory basis of cross-modal correspondences. *Chemosensory Perception, 4*(3), 80-90.

Deterding, D. (2004). How many vowel sounds are there in English? *STETS Language & Communication Review, 19*(10), 19-21.

Devine, P. G., & Elliot, A. J. (1995). Are racial stereotypes really fading? The Princeton trilogy revisited. *Personality and Social Psychology Bulletin, 21*, 1139-1150.

dia.govt.nz. (2011, 2011/07/14). Most popular male and female first names Retrieved from http://www.dia.govt.nz/diawebsite.nsf/wpg_URL/Services-Births-Deaths-and-Marriages-Name-Change-Frequently-Asked-Questions

Diener, E., Wolsic, B., & Fujita, F. (1995). Physical attractiveness and subjective well-being. *Journal of Personality and Social Psychology, 69*(1), 120-129. doi:Doi 10.1037//0022-3514.69.1.120

Dion, K., Berscheid, E., & Walster, E. (1972). What is beautiful is good. *Journal of Personality and Social Psychology, 24*(3), 285.

Dion, K. L., & Dion, K. K. (1987). Belief in a just world and physical attractiveness stereotyping. *Journal of Personality and Social Psychology, 52*(4), 775.

Dooley, M. (1982). Anthropometric modeling programs-a survey. *IEEE Computer Graphics and Applications, 2*(9), 17-25.

Efran, M. G. (1974). Effect of physical appearance on judgment of guilt, interpersonal attraction, and severity of recommended punishment in a simulated jury task. *Journal of Research in Personality, 8*(1), 45-54. doi:Doi 10.1016/0092-6566(74)90044-0

Erard, M. (2015). What's in a name? *Science, 347*(6225), 941-943. Retrieved from http://www.sciencemag.org/content/347/6225/941.short

Erwin, P. G. (1993). First names and perceptions of physical attractiveness. *Journal of Psychology, 127*(6), 625. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=9401147684&site=ehost-live&scope=site

Etcoff, N. L., Stock, S., Haley, L. E., Vickery, S. A., & House, D. M. (2011). Cosmetics as a feature of the extended human phenotype: Modulation of the perception of biologically important facial signals. *PLoS One, 6*(10), e25656.

Farkas, L. G. (1994). *Anthropometry of the head and face*: Raven Pr.

Figlio, D. N. (2007). Boys named Sue: Disruptive children and their peers. *Education, 2*(4), 376-394.

Fiske, S. T., Cuddy, A. J., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: competence and warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology, 82*(6), 878.

Forster, M., Leder, H., & Ansorge, U. (2013). It felt fluent, and I liked it: Subjective feeling of fluency rather than objective fluency determines liking. *Emotion, 13*(2), 280.

Friedman, G. (2015). Behind the narrow margins of victory in us presidential elections Retrieved from http://www.economywatch.com/economy-business-and-finance-news/behind-the-narrow-margins-of-victory-in-us-presidential-elections.31-10.html

Garwood, S. G., Cox, L., Kaplan, V., Wasserman, N., & Sulzer, J. L. (1980). Beauty is only "name" deep: the effect of first-name on ratings of physical attraction. *Journal of Applied Social Psychology, 10*(5), 431-435. doi:10.1111/j.1559-1816.1980.tb00721.x

Gasser, M. (2004). The origins of arbitrariness in language. *Proceedings of the Twenty-Sixth Annual Conference of the Cognitive Science Society*, 434-439. Retrieved from <Go to ISI>://WOS:000285044800091

Geniole, S. N., Denson, T. F., Dixson, B. J., Carre, J. M., & McCormick, C. M. (2015). Evidence from meta-analyses of the facial width-to-height ratio as an evolved cue of threat. *PLoS One, 10*(7), e0132726-e0132726. doi:10.1371/journal.pone.0132726

Goldberg, L. R. (1990). An alternative "description of personality": The Big-Five factor structure. *Journal of Personality and Social Psychology, 59*(6), 1216-1229. doi:10.1037/0022-3514.59.6.1216

Golle, J., Mast, F. W., & Lobmaier, J. S. (2013). Something to smile about: The interrelationship between attractiveness and emotional expression. *Cognition and Emotion, 28*(2), 298-310. doi:10.1080/02699931.2013.817383

Goot, M. (2002). Distrustful, disenchanted and disengaged? Polled opinion on politics, politicians and the parties: an historical perspective. *Parliament and Public Opinion, Papers on Parliament, 38*, 27.

Greitemeyer, T., & Kunz, I. (2013). Name-valence and physical attractiveness in Facebook: Their compensatory effects on friendship acceptance. *The Journal of social psychology, 153*(3), 257-260.

Gross, R. (2012). *Psychology: The Science of Mind and Behaviour 6th Edition*: Hachette UK.

Hamermesh, D. S., & Biddle, J. E. (1994). Beauty and the labor-market. *American Economic Review, 84*(5), 1174-1194. Retrieved from <Go to ISI>://WOS:A1994PY38200003

Haque, O. S., & Waytz, A. (2012). Dehumanization in medicine causes, solutions, and functions. *Perspectives on Psychological Science, 7*(2), 176-186.

Haselhuhn, M. P., Ormiston, M. E., & Wong, E. M. (2015). Men's facial width-to-height ratio predicts aggression: A meta-analysis. *PLoS One, 10*(4). doi:10.1371/journal.pone.0122637

Haselhuhn, M. P., Wong, E. M., Ormiston, M. E., Inesi, M. E., & Galinsky, A. D. (2014). Negotiating face-to-face: Men's facial structure predicts negotiation performance. *The Leadership Quarterly, 25*(5), 835-845.

Hatfield, E., & Sprecher, S. (1986). *Mirror, mirror: The importance of looks in everyday life*: SUNY Press.

Healthwatch, G. B. (2015). Throat cancer. Retrieved from https://www.gbhealthwatch.com/throatcancer-details.php

Higgins, D. M., Peterson, J. B., Pihl, R. O., & Lee, A. G. (2007). Prefrontal cognitive ability, intelligence, Big Five personality, and the prediction of advanced academic and workplace performance. *Journal of Personality and Social Psychology, 93*(2), 298.

Holland, M. K., & Wertheimer, M. (1964). Some physiognomic aspects of naming, or Maluma and Takete revisited. *Percept Mot Skills, 19*, 111-117. doi:10.2466/pms.1964.19.1.111

Jiang, X., Rosen, E., Zeffiro, T., VanMeter, J., Blanz, V., & Riesenhuber, M. (2006). Evaluation of a shape-based model of human face discrimination using fMRI and behavioral techniques. *Neuron, 50*(1), 159-172.

Kahneman, D. (2003). A perspective on judgment and choice: mapping bounded rationality. *American psychologist, 58*(9), 697.

Kalist, D. E., & Lee, D. Y. (2009). First names and crime: Does unpopularity spell trouble? *Social Science Quarterly, 90*(1), 39-49. Retrieved from <Go to ISI>://WOS:000262487900004

Kalist, D. E., Lee, D. Y., & Spurr, S. J. (2015). Predicting recidivism of juvenile offenders. *B E Journal of Economic Analysis & Policy, 15*(1), 329-351. doi:DOI 10.1515/bejeap-2013-0188

Karlins, M., Coffman, T. L., & Walters, G. (1969). On the fading of social stereotypes: studies in three generations of college students. *Journal of Personality and Social Psychology, 13*(1), 1.

Katz, D., & Braly, K. (1933). Racial stereotypes of one hundred college students. *The Journal of Abnormal and Social Psychology, 28*(3), 280.

Killen, J. D., Hayward, C., Wilson, D. M., Haydel, K. F., Robinson, T. N., Taylor, C. B., . . . Varady, A. (1996). Predicting onset of drinking in a community sample of adolescents: The role of expectancy and temperament. *Addictive behaviors, 21*(4), 473-480.

Kohler, W. (1947). Gestalt psychology (2nd ed.). New York: Liveright.

Kovic, V., Plunkett, K., & Westermann, G. (2010). The shape of words in the brain. *Cognition, 114*(1), 19-28. doi:http://dx.doi.org/10.1016/j.cognition.2009.08.016

Ladefoged, P. (1990). The revised international phonetic alphabet. *Language*, 550-552.

Langlois, J. H. (1986). *From the eye of the beholder to behavioral reality: Development of social behaviors and social relations as a function of physical attractiveness.* Paper presented at the Physical appearance, stigma, and social behavior: The Ontario Symposium.

Lau, S. (1982). The effect of smiling on person perception. *The Journal of social psychology, 117*(1), 63-67.

Lea, M. A., Thomas, R. D., Lamkin, N. A., & Bell, A. (2007). Who do you look like? Evidence of facial stereotypes for male names. *Psychonomic Bulletin & Review, 14*(5), 901-907. doi:Doi 10.3758/Bf03194119

Lisker, L. (1989). On the interpretation of vowel “quality”: The dimension of rounding. *Journal of the International Phonetic Association, 19*(01), 24-30.

Lundqvist, D., Flykt, A., & Öhman, A. (1998). The Karolinska directed emotional faces (KDEF). *CD ROM from Department of Clinical Neuroscience, Psychology section, Karolinska Institutet*, 91-630.

Maes, H. H., Neale, M. C., & Eaves, L. J. (1997). Genetic and environmental factors in relative body weight and human adiposity. *Behavior genetics, 27*(4), 325-351.

Marshall, W. L. (1996). The sexual offender: monster, victim, or everyman? *Sexual Abuse: A Journal of Research and Treatment, 8*(4), 317-335.

Maurer, D., Pathman, T., & Mondloch, C. J. (2006). The shape of boubas: sound-shape correspondences in toddlers and adults. *Developmental Science, 9*(3), 316-322. doi:DOI 10.1111/j.1467-7687.2006.00495.x

Maurer, R. E., & Tindall, J. H. (1983). Effect of postural congruence on client's perception of counselor empathy. *Journal of Counseling Psychology, 30*(2), 158.

Maxwell, G. M., & Cook, M. W. (1985). Postural congruence and judgements of liking and perceived similarity. *New Zealand Journal of Psychology, 14*(1), 20-26.

Michie, S., Marteau, T. M., & Bobrow, M. (1997). Genetic counselling: the psychological impact of meeting patients' expectations. *Journal of Medical Genetics, 34*(3), 237-241.

Mitchell, D. J., Kahn, B. E., & Knasko, S. C. (1995). There's something in the air: effects of congruent or incongruent ambient odor on consumer decision making. *Journal of Consumer Research*, 229-238.

Myers, D. G. (2001). *The American paradox: Spiritual hunger in an age of plenty*: Yale University Press.

Newton, K., & Norris, P. (2000). Confidence in public institutions. *Disaffected democracies. What's troubling the trilateral countries*.

Ngo, M. K., Misra, R., & Spence, C. (2011). Assessing the shapes and speech sounds that people associate with chocolate samples varying in cocoa content. *Food Quality and Preference, 22*(6), 567-572.

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of general psychology, 2*(2), 175.

Nielsen, A., & Rendall, D. (2011). The sound of round: Evaluating the sound-symbolic role of consonants in the classic Takete-Maluma phenomenon. *Canadian Journal of*

Experimental Psychology/Revue canadienne de psychologie expérimentale, *65*(2), 115.

Nisbett, R. E., & Wilson, T. D. (1977). The halo effect: Evidence for unconscious alteration of judgments. *Journal of Personality and Social Psychology*, *35*(4), 250.

Olivola, C. Y., Sussman, A. B., Tsetsos, K., Kang, O. E., & Todorov, A. (2012). Republicans prefer republican-looking leaders political facial stereotypes predict candidate electoral success among right-leaning voters. *Social Psychological and Personality Science*, *3*(5), 605-613.

Olivola, C. Y., & Todorov, A. (2010). Elected in 100 milliseconds: Appearance-based trait inferences and voting. *Journal of Nonverbal Behavior*, *34*(2), 83-110. doi:DOI 10.1007/s10919-009-0082-1

Orne, M. T. (2009). Demand characteristics and the concept of quasi-controls. *Artifacts in Behavioral Research: Robert Rosenthal and Ralph L. Rosnow's Classic Books*, 110.

Otta, E., Abrosio, F. F. E., & Hoshino, R. L. (1996). Reading a smiling face: Messages conveyed by various forms of smiling. *Percept Mot Skills*, *82*(3c), 1111-1121.

Ozturk, O., Krehm, M., & Vouloumanos, A. (2013). Sound symbolism in infancy: evidence for sound-shape cross-modal correspondences in 4-month-olds. *J Exp Child Psychol*, *114*(2), 173-186. doi:10.1016/j.jecp.2012.05.004

Pena, M., Mehler, J., & Nespor, M. (2011). The role of audiovisual processing in early conceptual development. *Psychol Sci*, *22*(11), 1419-1421. doi:10.1177/0956797611421791

Ramachandran, V., & Hubbard, E. M. (2001). Synaesthesia - A window into perception, thought and language. *Journal of Consciousness Studies*, *8*(12), 3-34. Retrieved from <Go to ISI>://WOS:000172469200001

Reber, R., Schwarz, N., & Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality and Social Psychology Review*, *8*(4), 364-382. doi:DOI 10.1207/s15327957pspr0804_3

Reber, R., Winkielman, P., & Schwarz, N. (1998). Effects of perceptual fluency on affective judgments. *Psychological Science (Wiley-Blackwell)*, *9*(1), 45. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=195011&site=ehost-live&scope=site

Rendall, D., & Owren, M. J. (2010). .4-Vocalizations as tools for influencing the affect and behavior of others. *Handbook of Behavioral Neuroscience*, *19*, 177-185.

Rogers, S. L. (1987). *Personal identification from human remains*: Charles C. Thomas Springfield, IL.

Rosar, U., Klein, M., & Beckers, T. (2008). The frog pond beauty contest: Physical attractiveness and electoral success of the constituency candidates at the North Rhine-Westphalia state election of 2005. *European Journal of Political Research, 47*(1), 64-79. doi:10.1111/j.1475-6765.2007.00720.x

Rosch, E. (1999). Principles of categorization. *Concepts: core readings*, 189-206.

Rowling, J., Cleese, J., Coltrane, R., & Davis, W. (2002). *Harry Potter and the Philosopher's Stone: Film*: Warner Home Video.

Rowling, J. K. (2014). *Harry Potter and the chamber of secrets*: Bloomsbury publishing.

Salgado, J. F. (1997). The Five Factor Model of personality and job performance in the European Community. *Journal of Applied Psychology, 82*(1), 30.

Sanghara, K. K. W. J. C. (2006). Stereotypes and attitudes about child sexual abusers: A comparison of experienced and inexperienced professionals in sex offender treatment. *Legal & Criminological Psychology, 11*(2), 229-244. doi:10.1348/135532505X68818

Sapir, E. (1929a). The Status of Linguistics as a Science. *Language, 5*(4), 207-214. doi:10.2307/409588

Sapir, E. (1929b). A study in phonetic symbolism. *Journal of Experimental Psychology, 12*, 225-239. doi:Doi 10.1037/H0070931

Seligman, M. E. (1990). Why is there so much depression today? The waxing of the individual and the waning of the commons *Contemporary psychological approaches to depression* (pp. 1-9): Springer.

Sigall, H., Page, R., & Brown, A. C. (1971). Effort expenditure as a function of evaluation and evaluator attractiveness. *Representative Research in Social Psychology, 2*(2), 19-25.

Spangenberg, E. R., Sprott, D. E., Grohmann, B., & Tracy, D. L. (2006). Gender-congruent ambient scent influences on approach and avoidance behaviors in a retail store. *Journal of Business Research, 59*(12), 1281-1287.

Spence, C. (2011). Crossmodal correspondences: A tutorial review. *Attention Perception & Psychophysics, 73*(4), 971-995. doi:DOI 10.3758/s13414-010-0073-7

Spence, C. (2012). Managing sensory expectations concerning products and brands: Capitalizing on the potential of sound and shape symbolism. *Journal of Consumer Psychology, 22*(1), 37-54. doi:http://dx.doi.org/10.1016/j.jcps.2011.09.004

SuperLab. (2006). 4.0 [Computer software].(2006). *Phoenix, AZ: Cedrus Corporation*.

Tarte, R. D. (1974). Phonetic symbolism in adult native speakers of Czech. *Lang Speech, 17*(Jan-M), 87-94. Retrieved from <Go to ISI>://WOS:A1974T081000009

Tarte, R. D., & Barritt, L. S. (1971). Phonetic symbolism in adult native speakers of English - 3 studies. *Lang Speech, 14*(Apr-J), 158-&. Retrieved from <Go to ISI>://WOS:A1971K057800006

Taylor, S. E., & Fiske, S. T. (1978). Salience, attention, and attribution: Top of the head phenomena. *Advances in experimental social psychology, 11*, 249-288.

Thorndike, E. L. (1920). A constant error in psychological ratings. *Journal of Applied Psychology, 4*(1), 25-29. doi:10.1037/h0071663

Todorov, A., Mandisodza, A. N., Goren, A., & Hall, C. C. (2005). Inferences of competence from faces predict election outcomes. *Science, 308*(5728), 1623-1626. doi:DOI 10.1126/science.1110589

Townes-O'Brien, M., Leiman, T., & Duffy, J. (2014). The power of naming: the multifaceted value of learning students' names. *QUT Law Review, 14*(1), 114-128.

Trout, D. L., & Rosenfeld, H. M. (1980). The effect of postural lean and body congruence on the judgment of psychotherapeutic rapport. *Journal of Nonverbal Behavior, 4*(3), 176-190.

Tversky, B., & Baratz, D. (1985). Memory for faces - are caricatures better Than photographs. *Mem Cognit, 13*(1), 45-49. doi:Doi 10.3758/Bf03198442

Twenge, J. M., Abebe, E. M., & Campbell, W. K. (2010). Fitting in or standing Out: Trends in American parents' choices for children's names, 1880–2007. *Social Psychological and Personality Science, 1*(1), 19-25.

Twenge, J. M., Campbell, W. K., & Carter, N. T. (2014). Declines in trust in others and confidence in institutions among American adults and late adolescents, 1972–2012. *Psychol Sci*, 0956797614545133.

Walker-Andrews, A. S., & Grolnick, W. (1983). Discrimination of vocal expressions by young infants. *Infant Behavior and Development, 6*(4), 491-498.

Waytz, A., Heafner, J., & Epley, N. (2014). The mind in the machine: Anthropomorphism increases trust in an autonomous vehicle. *Journal of Experimental Social Psychology, 52*, 113-117.

Whalen, D. H., & Levitt, A. G. (1995). The Universality of Intrinsic F-0 of Vowels. *Journal of Phonetics, 23*(3), 349-366. doi:Doi 10.1016/S0095-4470(95)80165-0

Williams, S., Weinman, J., Dale, J., & Newman, S. (1995). Patient expectations: What do primary care patients want from the GP and how far does meeting expectations affect patient satisfaction? *Family practice, 12*(2), 193-201.

Willis, J., & Todorov, A. (2006). First impressions making up your mind after a 100-ms exposure to a face. *Psychol Sci, 17*(7), 592-598.

Winkielman, P., & Cacioppo, T. (2001). Mind at ease puts a smile on the face: psychophysiological evidence that processing facilitation elicits positive affect. *Journal of Personality and Social Psychology, 81*(6), 989.

Wong, E. M., Ormiston, M. E., & Haselhuhn, M. P. (2011). A face only an investor could love: CEOs' facial structure predicts their firms' financial performance. *Psychol Sci*. doi:10.1177/0956797611418838

Yeomans, M. R., Chambers, L., Blumenthal, H., & Blake, A. (2008). The role of expectancy in sensory and hedonic evaluation: The case of smoked salmon ice-cream. *Food Quality and Preference, 19*(6), 565-573. doi:DOI 10.1016/j.foodqual.2008.02.009

Appendix A

Study	Face Number	Face Type	Chin Angle (degrees)	Subject Rating	Subject Rating Reverse Coded
1	1	RoundFace1	102	2.49	7.51
1	2	RoundFace2	120	1.79	8.21
1	3	RoundFace3	91	2.00	8.00
1	4	RoundFace4	106	2.31	7.69
1	5	RoundFace5	110	2.28	7.72
1	6	RoundFace6	100	1.78	8.22
1	7	RoundFace7	100	2.82	7.18
1	8	RoundFace8	106	3.39	6.61
1	9	RoundFace9	106	2.91	7.09
1	10	RoundFace10	118	2.49	7.51
1	11	RoundFace11	100	3.52	6.48
1	12	RoundFace12	111	3.46	6.54
1	13	RoundFace13	100	2.82	7.18
1	14	RoundFace14	112	2.10	7.90
1	15	RoundFace15	95	2.09	7.91
1	16	RoundFace16	104	1.96	8.04
1	17	SpikeyFace1	90	4.96	5.04
1	18	SpikeyFace2	80	6.12	3.88
1	19	SpikeyFace3	88	4.81	5.19
1	20	SpikeyFace4	86	6.13	3.87
1	21	SpikeyFace5	90	6.06	3.94
1	22	SpikeyFace6	83	5.85	4.15
1	23	SpikeyFace7	73	6.07	3.93
1	24	SpikeyFace8	72	7.12	2.88
1	25	SpikeyFace9	90	6.04	3.96
1	26	SpikeyFace10	82	6.70	3.30
1	27	SpikeyFace11	84	7.01	2.99
1	28	SpikeyFace12	70	7.27	2.73
1	29	SpikeyFace13	77	5.94	4.06
1	30	SpikeyFace14	85	6.27	3.73
1	31	SpikeyFace15	80	7.09	2.91
1	32	SpikeyFace16	86	7.13	2.87
2	33	JR1_1	97	3.06	6.94
2	34	JR10_1	98	2.40	7.60
2	35	JR11_1	106	2.20	7.80
2	36	JR12_1	105	2.44	7.56
2	37	JR13_1	100	2.55	7.45
2	38	JR14_1	97	1.95	8.05
2	39	JR15_1	107	2.55	7.45

Study	Face Number	Face Type	Chin Angle (degrees)	Subject Rating	Subject Rating Reverse Coded
2	40	JR16_1	109	1.95	8.05
2	41	JR17_1	103	2.98	7.02
2	42	JR18_1	114	2.44	7.56
2	43	JR19_1	97	2.32	7.68
2	44	JR2_1	114	2.77	7.23
2	45	JR20_1	105	2.75	7.25
2	46	JR3_1	99	3.41	6.59
2	47	JR4_1	107	2.68	7.32
2	48	JR5_1	100	3.60	6.40
2	49	JR6_1	105	2.28	7.72
2	50	JR7_1	97	2.50	7.50
2	51	JR8_1	97	1.65	8.35
2	52	JR9_1	94	2.55	7.45
2	53	JS1_1	83	6.69	3.31
2	54	JS10_1	75	7.40	2.60
2	55	JS11_1	77	5.55	4.45
2	56	JS12_1	83	6.23	3.77
2	57	JS13_1	75	7.95	2.05
2	58	JS14_1	81	5.96	4.04
2	59	JS15_1	78	6.72	3.28
2	60	JS16_1	84	6.68	3.32
2	61	JS17_1	85	5.49	4.51
2	62	JS18_1	82	6.81	3.19
2	63	JS19_1	82	6.69	3.31
2	64	JS2_1	76	6.51	3.49
2	65	JS3_1	82	5.92	4.08
2	66	JS4_1	89	5.88	4.12
2	67	JS5_1	77	6.91	3.09
2	68	JS6_1	70	7.20	2.80
2	69	JS7_1	76	6.80	3.20
2	70	JS8_1	78	7.05	2.95
2	71	JS9_1	74	7.31	2.69
2	72	JS20_1	74	7.10	2.90
3	73	Round (14).jpg	99	1.68	8.32
3	74	Round (16).jpg	106	1.75	8.25
3	75	Spiky (3).jpg	84	5.99	4.01
3	76	Round (11).jpg	108	1.97	8.03
3	77	Round (13).jpg	100	2.34	7.66
3	78	Round (5).jpg	97	3.47	6.53
3	79	Spiky (20).jpg	70	7.23	2.77
3	80	Spiky (9).jpg	77	7.41	2.59
3	81	Round (8).jpg	101	1.37	8.63

Study	Face Number	Face Type	Chin Angle (degrees)	Subject Rating	Subject Rating Reverse Coded
3	82	Spiky (14).jpg	82	6.03	3.97
3	83	Round (6).jpg	104	2.10	7.90
3	84	Round (4).jpg	105	2.49	7.51
3	85	Round (20).jpg	110	2.54	7.46
3	86	Spiky (12).jpg	80	6.25	3.75
3	87	Round (19).jpg	97	2.05	7.95
3	88	Round (7).jpg	99	2.31	7.69
3	89	Round (3).jpg	97	3.20	6.80
3	90	Spiky (16).jpg	84	6.78	3.22
3	91	Spiky (10).jpg	75	7.56	2.44
3	92	Round (12).jpg	105	2.25	7.75
3	93	Round (15).jpg	105	2.32	7.68
3	94	Round (18).jpg	103	2.28	7.72
3	95	Round (9).jpg	93	2.35	7.65
3	96	Round (17).jpg	102	2.78	7.22
3	97	Round (1).jpg	100	2.95	7.05
3	98	Spiky (7).jpg	77	6.92	3.08
3	99	Spiky (8).jpg	77	7.17	2.83
3	100	Round (10).jpg	95	2.17	7.83
3	101	Round (2).jpg	114	2.57	7.43
3	102	Spiky (17).jpg	83	5.45	4.55
3	103	Spiky (2).jpg	80	6.56	3.44
3	104	Spiky (18).jpg	82	6.90	3.10
3	105	Spiky (5).jpg	76	6.96	3.04
3	106	Spiky (6).jpg	70	7.29	2.71
3	107	Spiky (11).jpg	78	5.58	4.42
3	108	Spiky (1).jpg	80	6.79	3.21
3	109	Spiky (19).jpg	81	6.81	3.19
3	110	Spiky (15).jpg	78	6.86	3.14
3	111	Spiky (13).jpg	74	8.05	1.95
3	112	Spiky (4).jpg	86	5.93	4.07
4	113	spikyneutral25	67	7.14	1.86
4	114	spikyneutral23	78	6.87	2.13
4	115	spikyneutral20	82	6.20	2.80
4	116	spikyneutral22	81	6.00	3.00
4	117	spikyneutral24	78	5.96	3.04
4	118	spikyneutral21	80	5.87	3.13
4	119	spikyneutral12	87	5.72	3.28
4	120	spikyneutral26	87	5.53	3.47
4	121	spikyneutral18	89	5.39	3.61
4	122	spikyneutral38	83	5.24	3.76
4	123	spikyneutral39	86	5.18	3.82

Study	Face Number	Face Type	Chin Angle (degrees)	Subject Rating	Subject Rating Reverse Coded
4	124	spikyneutral35	85	5.12	3.88
4	125	spikyneutral14	87	5.03	3.97
4	126	roundneutral8	87	4.90	4.10
4	127	spikyneutral13	88	4.88	4.12
4	128	spikyneutral9	82	4.67	4.33
4	129	roundneutral12	81	4.64	4.36
4	130	spikyneutral27	95	4.62	4.38
4	131	spikyneutral30	86	4.56	4.44
4	132	spikyneutral4	93	4.50	4.50
4	133	roundneutral23	94	4.49	4.51
4	134	spikyneutral33	85	4.48	4.52
4	135	spikyneutral10	90	4.37	4.63
4	136	spikyneutral2	88	4.35	4.65
4	137	roundneutral24	85	4.35	4.65
4	138	roundneutral28	90	4.32	4.68
4	139	spikyneutral34	91	4.24	4.76
4	140	spikyneutral8	86	4.16	4.84
4	141	spikyneutral37	90	4.14	4.86
4	142	roundneutral27	90	4.13	4.87
4	143	roundneutral30	92	4.13	4.87
4	144	spikyneutral19	92	4.12	4.88
4	145	spikyneutral6	93	4.09	4.91
4	146	spikyneutral3	97	4.03	4.97
4	147	roundneutral22	95	4.02	4.98
4	148	roundneutral6	86	3.99	5.01
4	149	roundneutral26	96	3.96	5.04
4	150	spikyneutral5	92	3.94	5.06
4	151	roundneutral13	89	3.89	5.11
4	152	spikyneutral7	91	3.82	5.18
4	153	spikyneutral36	97	3.82	5.18
4	154	roundneutral10	94	3.68	5.32
4	155	spikyneutral1	88	3.65	5.35
4	156	roundneutral33	93	3.60	5.40
4	157	roundneutral2	98	3.58	5.42
4	158	roundneutral31	92	3.57	5.43
4	159	spikyneutral28	97	3.57	5.43
4	160	spikyneutral11	87	3.56	5.44
4	161	roundneutral34	94	3.50	5.50
4	162	roundneutral1	90	3.49	5.51
4	163	roundneutral11	90	3.48	5.52
4	164	spikyneutral17	91	3.44	5.56
4	165	roundneutral3	96	3.34	5.66

Study	Face Number	Face Type	Chin Angle (degrees)	Subject Rating	Subject Rating Reverse Coded
4	166	roundneutral17	97	3.33	5.67
4	167	roundneutral25	87	3.21	5.79
4	168	spikyneutral29	90	3.17	5.83
4	169	spikyneutral15	89	3.09	5.91
4	170	spikyneutral32	95	2.98	6.02
4	171	roundneutral4	93	2.97	6.03
4	172	spikyneutral16	96	2.84	6.16
4	173	spikyneutral31	94	2.82	6.18
4	174	roundneutral9	98	2.75	6.25
4	175	roundneutral7	100	2.66	6.34
4	176	roundneutral29	95	2.62	6.38
4	177	roundneutral14	100	2.61	6.39
4	178	roundneutral32	99	2.54	6.46
4	179	roundneutral18	98	2.31	6.69
4	180	roundneutral19	93	2.29	6.71
4	181	roundneutral5	90	1.95	7.05
4	182	roundneutral20	98	1.89	7.11
4	183	roundneutral16	103	1.86	7.14
4	184	roundneutral21	105	1.43	7.57
4	185	roundneutral15	112	1.37	7.63
5	186	RoundAttractive1	88	4.73	5.27
5	187	RoundAttractive2	95	5.28	4.72
5	188	RoundAttractive3	78	4.70	5.30
5	189	RoundAttractive10	100	4.76	5.24
5	190	RoundAttractive11	106	3.72	6.28
5	191	RoundAttractive12	104	3.42	6.58
5	192	RoundAttractive13	102	3.35	6.65
5	193	RoundAttractive14	90	3.82	6.18
5	194	RoundAttractive15	93	5.09	4.91
5	195	RoundAttractive16	94	5.25	4.75
5	196	RoundAttractive17	115	2.57	7.43
5	197	RoundAttractive18	94	4.11	5.89
5	198	RoundAttractive19	103	4.82	5.18
5	199	RoundAttractive20	92	4.69	5.31
5	200	RoundAttractive21	89	5.09	4.91
5	201	RoundAttractive22	84	3.81	6.19
5	202	RoundAttractive23	87	4.21	5.79
5	203	RoundAttractive4	100	3.78	6.22
5	204	RoundAttractive5	87	3.90	6.10
5	205	RoundAttractive6	93	4.26	5.74
5	206	RoundAttractive7	91	4.30	5.70
5	207	RoundAttractive8	93	3.33	6.67

Study	Face Number	Face Type	Chin Angle (degrees)	Subject Rating	Subject Rating Reverse Coded
5	208	RoundAttractive9	92	3.57	6.43
5	209	RoundUnattractive1	108	3.85	6.15
5	210	RoundUnattractive10	107	2.52	7.48
5	211	RoundUnattractive11	106	3.24	6.76
5	212	RoundUnattractive12	109	2.36	7.64
5	213	RoundUnattractive13	104	2.76	7.24
5	214	RoundUnattractive14	104	4.39	5.61
5	215	RoundUnattractive15	101	3.65	6.35
5	216	RoundUnattractive16	109	2.18	7.82
5	217	RoundUnattractive17	113	2.63	7.37
5	218	RoundUnattractive18	104	2.07	7.93
5	219	RoundUnattractive2	120	1.65	8.35
5	220	RoundUnattractive3	107	1.79	8.21
5	221	RoundUnattractive4	110	2.06	7.94
5	222	RoundUnattractive5	100	2.14	7.86
5	223	RoundUnattractive7	101	3.89	6.11
5	224	RoundUnattractive8	100	3.75	6.25
5	225	RoundUnattractive9	114	2.72	7.28
5	226	RoundUnattractive19	110	2.77	7.23
5	227	RoundUnattractive20	105	3.23	6.77
5	228	SpikyAttractive1	70	7.40	2.60
5	229	SpikyAttractive10	76	6.79	3.21
5	230	SpikyAttractive11	77	6.77	3.23
5	231	SpikyAttractive12	85	5.33	4.67
5	232	SpikyAttractive13	76	5.81	4.19
5	233	SpikyAttractive14	76	6.05	3.95
5	234	SpikyAttractive15	81	5.38	4.62
5	235	SpikyAttractive16	82	6.00	4.00
5	236	SpikyAttractive17	85	6.38	3.62
5	237	SpikyAttractive18	87	4.78	5.22
5	238	SpikyAttractive2	86	5.71	4.29
5	239	SpikyAttractive3	85	6.33	3.67
5	240	SpikyAttractive4	80	7.39	2.61
5	241	SpikyAttractive5	87	5.24	4.76
5	242	SpikyAttractive6	77	8.11	1.89
5	243	SpikyAttractive7	79	6.54	3.46
5	244	SpikyAttractive8	87	5.34	4.66
5	245	SpikyAttractive9	86	6.15	3.85
5	246	SpikyAttractive19	88	6.48	3.52
5	247	SpikyAttractive20	74	7.43	2.57
5	248	SpikyUnttractive1	82	6.67	3.33
5	249	SpikyUnattractive10	81	6.82	3.18

Study	Face Number	Face Type	Chin Angle (degrees)	Subject Rating	Subject Rating Reverse Coded
5	250	SpikyUnattractive11	75	7.47	2.53
5	251	SpikyUnattractive12	76	7.55	2.45
5	252	SpikyUnattractive13	77	6.15	3.85
5	253	SpikyUnattractive14	88	5.13	4.87
5	254	SpikyUnattractive2	83	7.42	2.58
5	255	SpikyUnattractive3	82	7.92	2.08
5	256	SpikyUnattractive4	82	4.76	5.24
5	257	SpikyUnattractive5	87	6.71	3.29
5	258	SpikyUnattractive6	85	5.46	4.54
5	259	SpikyUnattractive7	95	4.72	5.28
5	260	SpikyUnattractive8	83	6.53	3.47
5	261	SpikyUnattractive9	90	7.58	2.42
5	262	SpikyUnattractive15	95	4.13	5.87
5	263	SpikyUnattractive16	95	5.77	4.23
5	264	SpikyUnattractive17	87	5.23	4.77
5	265	SpikyUnattractive20	81	6.80	3.20
5	266	SpikyUnattractive18	79	7.61	2.39
5	267	SpikyUnattractive19	83	6.69	3.31

Appendix B

Gordon	George	Cody	Rob	Bo
Ronald	Paul	Aaron	Howard	Roan
Tom	Jo	Todd	Dooley	Noah
Bob	Josh	Otto	Odon	Connor
Ron	Cole	Don	Hugo	Joe
Alex	Iggy	Vic	Felix	Ezra
Ike	Alvin	Virgil	Mike	Nick
Reza	Ivan	Levi	Rick	Vince
Zeke	Zane	Kevin	Jake	Fritz
Spike	Travis	Kyle	Elvis	Larkin

Appendix C

Election ID	Candidate	Race	Year	State	Party	Age	Face Average	Name Average	Match Score	Votes %
80	AlKing	S	2004	OR	N	63	1.84	4.91	2.11	0.33
96	StevenRosile	S	2002	KS	L	57	1.98	4.53	1.61	0.1
34	TedKennedy	S	2006	MA	T	77	2.03	4.70	1.75	0.77
21	LindseyGraham	S	2008	SC	N	54	2.31	4.30	1.13	0.565
137	BillRedmond	S	2000	NM	N	61	2.32	3.91	0.71	0.38
55	RobertLorge	S	2006	WI	N	50	2.32	3.94	0.74	0.3
22	TimJohnson	S	2008	SD	T	63	2.38	3.85	0.60	0.56
134	BrianSchweitzer	S	2000	MT	T	54	2.64	6.81	3.59	0.48
23	BobTuke	S	2008	TN	T	62	2.68	5.27	1.91	0.32
3	BobSchaffer	S	2008	CO	N	47	2.74	3.98	0.49	0.42
136	BenNelson	S	2000	NE	T	68	2.86	3.21	0.42	0.51
12	CarlLevin	S	2008	MI	T	75	2.89	4.54	0.99	0.625
119	MarkPryor	S	2002	AR	T	47	2.89	4.70	1.15	0.54
139	TedCeleste	S	2000	OH	T	64	2.91	5.02	1.49	0.37
40	PeteRicketts	S	2006	NE	N	45	2.93	6.84	3.43	0.36
60	KenSalazar	S	2004	CO	T	55	2.94	5.97	2.49	0.52
100	WalterMondale	S	2002	MN	T	81	2.94	4.12	0.51	0.49
18	StevePearce	S	2008	NM	N	62	2.96	4.45	0.84	0.39
85	PatrickLeahy	S	2004	VT	T	70	3.03	4.70	1.07	0.74
55	HerbertKohl	S	2006	WI	T	75	3.11	5.44	1.80	0.66
17	DickZimmer	S	2008	NJ	N	65	3.14	6.54	2.96	0.42
103	MikeTaylor	S	2002	MT	N	68	3.23	4.72	0.95	0.34
70	JohnKennedy	S	2004	LA	T	58	3.24	4.34	0.53	0.23
61	ChrisDodd	S	2004	CT	T	65	3.34	3.68	0.25	0.67
2	MarkBegich	S	2008	AK	T	48	3.36	5.84	2.06	0.48
102	ShawnO'Hara	S	2002	MS	I	32	3.36	3.34	0.62	0.15
146	EdFlanagan	S	2000	VT	T	59	3.36	4.42	0.54	0.28
84	PaulVan Dam	S	2004	UT	T	71	3.37	4.91	1.06	0.3
7	JackReed	S	2008	IA	N	37	3.38	4.69	0.81	0.575
142	JeffClark	S	2000	TN	T		3.40	4.88	1.00	0.33
68	DanielMongiardo	S	2004	KY	T	50	3.50	5.19	1.27	0.28
107	DouglasForrester	S	2002	NJ	N		3.53	4.76	0.79	0.45
87	TimMichels	S	2004	WI	N	47	3.56	4.81	0.81	0.44
111	BobTingle	S	2002	RI	T	52	3.56	4.87	0.88	0.22
4	SaxbyChambliss	S	2008	GA	N	66	3.59	6.75	2.88	0.555
52	JimWebb	S	2006	VA	T	64	3.60	3.68	0.42	0.5
28	JimPederson	S	2006	AZ	T	67	3.62	4.32	0.26	0.45
68	JimBunning	S	2004	KY	N	78	3.64	3.80	0.32	0.72
70	DavidVitter	S	2004	LA	N	48	3.67	6.29	2.32	0.77
88	FrankVondersaar	S	2002	AK	T		3.67	6.52	2.58	0.12
22	JoelDykstra	S	2008	SD	N	52	3.74	6.70	2.72	0.38

Election ID	Candidate	Race	Year	State	Party	Age	Face Average	Name Average	Match Score	Votes %
6	SteveSauerberg	S	2008	IL	N	56	3.74	5.30	1.22	0.29
95	JimDurkin	S	2002	IL	N	48	3.76	5.25	1.15	0.39
102	ThadCochran	S	2002	MS	N	72	3.76	5.37	1.28	0.85
44	DwightGrotberg	S	2006	ND	N	43	3.85	6.23	2.14	0.3
54	RobertByrd	S	2006	WV	T	92	3.89	4.14	0.13	0.66
112	AlexSanders	S	2002	SC	T		3.91	4.44	0.18	0.45
25	JimGilmore	S	2008	VA	N	60	3.94	3.82	0.50	0.34
27	MikeEnzi	S	2008	WY	N	66	3.94	6.02	1.85	0.76
138	EdwardBernstein	S	2000	NV	T		3.97	4.95	0.69	0.42
12	JackHoogendyk	S	2008	MI	N	54	4.00	5.82	1.60	0.34
75	RichardZiser	S	2004	NV	N	56	4.01	6.35	2.16	0.37
73	RichardBurr	S	2004	NC	N	54	4.05	4.13	0.25	0.52
105	CharlieMatulka	S	2002	NE	T	36	4.13	6.65	2.40	0.15
5	LarryLaRocco	S	2008	ID	T	63	4.14	5.28	0.92	0.34
52	GeorgeAllen	S	2006	VA	N	58	4.16	3.38	1.12	0.51
140	RonKlink	S	2000	PA	T	58	4.18	6.23	1.91	0.46
27	ChrisRothfuss	S	2008	WY	T	37	4.19	5.10	0.69	0.24
90	TomStrickland	S	2002	CO	T		4.26	6.28	1.91	0.47
18	TomUdall	S	2008	NM	T	61	4.31	4.00	0.56	0.61
114	BobClement	S	2002	TN	T	65	4.35	4.29	0.29	0.45
77	HowardMills	S	2004	NY	N	45	4.35	3.72	0.89	0.26
20	JeffMerkley	S	2008	OR	T	53	4.37	5.97	1.50	0.49
14	BobKelleher	S	2008	MT	N	86	4.38	4.99	0.45	0.27
39	ConradBurns	S	2006	MT	N	75	4.39	3.99	0.63	0.51
99	RockyRaczkowski	S	2002	MI	N	41	4.40	8.24	3.91	0.38
109	DavidWalters	S	2002	OK	T	58	4.41	4.36	0.25	0.39
6	DickDurbin	S	2008	IL	T	65	4.46	5.18	0.60	0.645
92	MaxCleland	S	2002	GA	T	67	4.47	5.28	0.69	0.46
5	JamesRisch	S	2008	ID	N	66	4.50	4.80	0.16	0.58
144	ScottHowell	S	2000	UT	T		4.50	4.10	0.59	0.32
148	EdGillespie	S	2000	WI	N		4.52	5.23	0.61	0.38
132	RodGrams	S	2000	MN	N	62	4.56	3.83	0.92	0.47
132	MarkDayton	S	2000	MN	T	63	4.57	5.00	0.32	0.53
15	ScottKleeb	S	2008	NE	T	34	4.65	5.67	0.99	0.4
119	TimHutchinson	S	2002	AR	N	60	4.66	5.70	1.01	0.46
40	SheffieldNelson	S	2006	NE	T	68	4.67	4.67	0.10	0.64
51	BernieSanders	S	2006	VT	I	68	4.69	3.95	0.88	0.53
125	ZellMiller	S	2000	GA	T	78	4.69	5.33	0.60	0.6
28	JonKyl	S	2006	AZ	N	68	4.71	5.51	0.78	0.55
141	BobWeygand	S	2000	RI	T	61	4.85	4.86	0.02	0.42
124	BillMcCollum	S	2000	FL	N	65	4.87	4.21	0.73	0.48
93	GregGanske	S	2002	IA	N	60	4.87	5.91	1.10	0.45
123	WilliamRoth	S	2000	DE	N	88	4.90	3.87	1.12	0.44
91	RaymondClatworthy	S	2002	DE	N		4.94	6.19	1.35	0.41

Election ID	Candidate	Race	Year	State	Party	Age	Face Average	Name Average	Match Score	Votes %
75	HarryReid	S	2004	NV	T	70	4.95	4.13	0.86	0.63
14	MaxBaucus	S	2008	MT	T	68	4.95	5.87	1.00	0.695
109	JamesInhofe	S	2002	OK	N	75	4.99	4.63	0.36	0.61
39	JonTester	S	2006	MT	T	53	5.04	5.10	0.11	0.5
26	JayWolfe	S	2008	WV	N	54	5.06	4.02	1.06	0.365
105	ChuckHagel	S	2002	NE	N	63	5.19	5.16	0.07	0.85
74	ByronDorgan	S	2004	ND	T	67	5.20	4.51	0.63	0.68
2	TedStevens	S	2008	AK	N	86	5.20	4.60	0.54	0.51
45	MikeDeWine	S	2006	OH	N	62	5.30	5.23	0.07	0.535
9	MitchMcConnell	S	2008	KY	N	68	5.30	5.32	0.17	0.53
44	KentConrad	S	2006	ND	T		5.31	5.31	0.16	0.655
80	RonWyden	S	2004	OR	T	60	5.32	4.32	0.91	0.67
81	ArlenSpecter	S	2004	PA	N	58	5.32	5.71	0.58	0.56
50	OrrinHatch	S	2006	UT	N	76	5.36	4.92	0.30	0.675
79	TomCoburn	S	2004	OK	N	62	5.37	3.98	1.32	0.56
45	SherodBrown	S	2006	OH	T	57	5.38	3.66	1.67	0.56
54	JohnRaese	S	2006	WV	N	59	5.40	3.77	1.56	0.34
81	JoeHoeffel	S	2004	PA	T	59	5.44	4.03	1.31	0.44
21	BobConley	S	2008	SC	T	44	5.45	3.60	1.78	0.42
61	JackOrchulli	S	2004	CT	N	63	5.46	6.18	0.98	0.33
3	MarkUdall	S	2008	CO	T	59	5.53	4.32	1.06	0.53
9	BruceLunsford	S	2008	KY	T	62	5.53	4.12	1.27	0.47
47	LincolnChafee	S	2006	RI	N	57	5.59	5.54	0.21	0.525
127	DavidJohnson	S	2000	IN	T		5.59	3.68	1.79	0.33
125	MackMattingly	S	2000	GA	N	79	5.60	6.10	0.80	0.4
26	JayRockefeller	S	2008	WV	T	72	5.64	5.76	0.41	0.635
146	JimJeffords	S	2000	VT	N	75	5.64	4.49	0.96	0.72
87	RussFeingold	S	2004	WI	T	57	5.66	4.90	0.53	0.56
90	WayneAllard	S	2002	CO	N	66	5.68	3.86	1.66	0.53
124	BillNelson	S	2000	FL	T	67	5.69	3.43	2.13	0.52
91	JoeBiden	S	2002	DE	T	67	5.70	3.96	1.56	0.59
8	JimSlattery	S	2008	KS	T	61	5.71	5.78	0.38	0.37
20	GordonSmith	S	2008	OR	N	57	5.76	3.56	2.03	0.525
41	JackCarter	S	2006	NV	T	62	5.83	5.17	0.36	0.43
23	LamarAlexander	S	2008	TN	N	69	5.85	4.96	0.59	0.6
43	JeffBingaman	S	2006	NM	T	66	6.02	4.95	0.72	0.66
7	TomHarkin	S	2008	IA	T	70	6.04	5.25	0.42	0.59
78	EricFingerhut	S	2004	OH	T	50	6.04	6.07	0.46	0.36
136	DonStenberg	S	2000	NE	N		6.04	5.11	0.56	0.49
47	SheldonWhitehous	S	2006	RI	T	54	6.05	4.96	0.73	0.53
67	CharlesGrassley	S	2004	IA	N	76	6.13	4.31	1.48	0.72
127	RichardLugar	S	2000	IN	N	77	6.17	4.89	0.90	0.67
74	MikeLiffrig	S	2004	ND	N	50	6.24	6.17	0.43	0.32
15	MikeJohanns	S	2008	NE	N	59	6.27	4.33	1.55	0.58

Election ID	Candidate	Race	Year	State	Party	Age	Face Average	Name Average	Match Score	Votes %
46	BobCasey	S	2006	PA	T	50	6.35	3.43	2.58	0.59
79	BradCarson	S	2004	OK	T	43	6.38	3.86	2.14	0.44
128	JimRappaport	S	2000	MD	N		6.38	5.48	0.41	0.37
67	ArtSmall	S	2004	IA	T	76	6.40	3.97	2.04	0.28
123	TomCarper	S	2000	DE	T	63	6.62	4.40	1.72	0.56
51	RichardTarrant	S	2006	VT	N	67	6.66	5.48	0.60	0.33
41	JohnEnsign	S	2006	NV	N	52	6.72	3.89	2.35	0.575
4	JimMartin	S	2008	GA	T	64	6.81	3.88	2.42	0.43
8	PatRoberts	S	2008	KS	N	74	6.85	4.27	2.03	0.75
25	MarkWarner	S	2008	VA	T	83	6.86	4.10	2.22	0.65
85	JackMcMullen	S	2004	VT	N	69	6.87	5.69	0.52	0.26
100	NormColeman	S	2002	MN	N	60	6.91	3.55	2.84	0.51
83	JohnThune	S	2004	SD	N	49	6.93	3.95	2.41	0.505
84	BobBennett	S	2004	UT	N	76	6.93	3.59	2.80	0.7
73	ErskineBowles	S	2004	NC	T	64	7.04	6.40	0.13	0.48
94	LarryCraig	S	2002	ID	N	64	7.13	4.54	1.92	0.67
17	FrankLautenberg	S	2008	NJ	T	86	7.14	6.56	0.23	0.555
77	CharlesSchumer	S	2004	NY	T	59	7.20	4.10	2.45	0.74
83	TomDaschle	S	2004	SD	T	62	7.20	4.62	1.89	0.49
43	AllenMcCulloch	S	2006	NM	N		7.28	5.19	1.33	0.3
46	RickSantorum	S	2006	PA	N	51	7.29	5.80	0.68	0.475
110	BillBradbury	S	2002	OR	T	60	7.33	4.23	2.40	0.41
50	PeteAshdown	S	2006	UT	T	42	7.43	4.77	1.88	0.33
78	GeorgeVoinovich	S	2004	OH	N	73	7.46	6.80	0.27	0.64
142	BillFrist	S	2000	TN	N	58	7.56	5.48	1.22	0.64
60	PeteCoors	S	2004	CO	N	63	7.60	4.12	2.69	0.48
145	ChuckRobb	S	2000	VA	T	70	7.67	4.04	2.84	0.48
34	KennethChase	S	2006	MA	N	50	7.71	4.74	2.11	0.31
94	AlanBlinken	S	2002	ID	T	72	7.84	5.54	1.34	0.33

Appendix D

Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Bob Weygand	4.34	0.02		0.42	1
	Mike DeWine	4.84	0.07	0.41	0.54	1
	Chuck Hagel	5.42	0.07	0.79	0.85	1
	Sheffield Nelson	4.01	0.10	0.61	0.64	1
	Jon Tester	4.59	0.11	0.16	0.50	1

Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Robert Byrd	3.99	0.13	0.33	0.66	1
	Erskine Bowles	3.68	0.13	0.27	0.48	1
	Kent Conrad	5.48	0.16	0.54	0.66	1
	James Risch	5.12	0.16		0.58	1
	Mitch McConnell	4.46	0.17		0.53	1

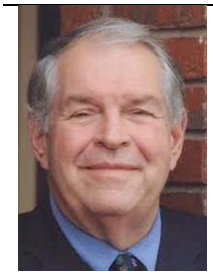
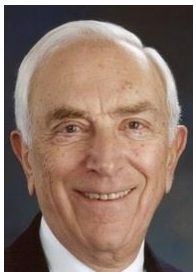
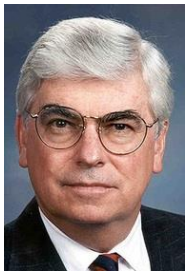
Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Alex Sanders	4.55	0.18	0.57	0.45	1
	Lincoln Chafee	4.33	0.21	0.21	0.53	1
	Frank Lautenberg	4.95	0.23		0.56	1
	Chris Dodd	4.13	0.25	0.62	0.67	1
	Richard Burr	4.60	0.25	0.73	0.52	1

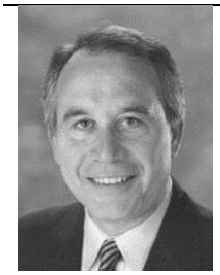
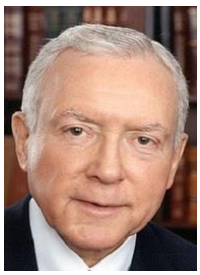
Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	David Walters	5.21	0.25	0.45	0.39	1
	Jim Pederson	4.83	0.26	0.21	0.45	1
	George Voinovich	5.64	0.27	0.42	0.64	1
	Bob Clement	4.63	0.29	0.52	0.45	1
	Orrin Hatch	4.81	0.30	0.91	0.68	1

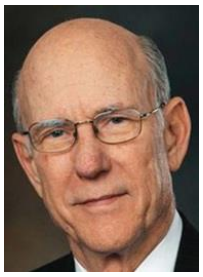
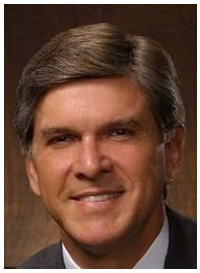
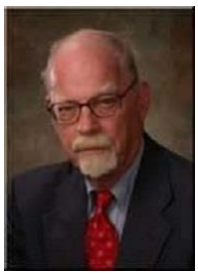
Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Jim Bunning	4.26	0.32	0.64	0.72	1
	Mark Dayton	5.42	0.32	0.57	0.53	1
	Pat Roberts	4.83	2.03		0.75	2
	Gordon Smith	5.02	2.03		0.53	2
	Art Small	4.17	2.04	0.52	0.28	2

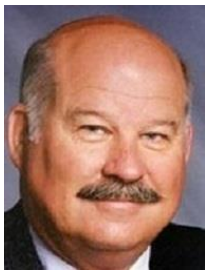
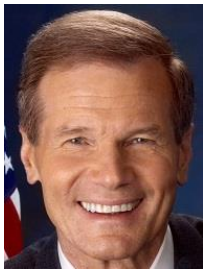
Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Mark Begich	4.78	2.06		0.48	2
	Kenneth Chase	5.53	2.11	0.33	0.31	2
	Al King	4.67	2.11	0.40	0.33	2
	Bill Nelson	5.19	2.13	0.61	0.52	2
	Dwight Grotberg	5.71	2.14	0.46	0.30	2

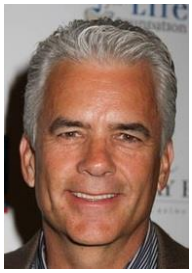
Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Brad Carson	5.73	2.14	0.29	0.44	2
	Richard Ziser	4.96	2.16	0.25	0.37	2
	Mark Warner	4.39	2.22		0.65	2
	David Vitter	5.74	2.32	0.65	0.77	2
	John Ensign	5.59	2.35	0.83	0.58	2

Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Charlie Matulka	4.57	2.40	0.21	0.15	2
	Bill Bradbury	4.75	2.40	0.40	0.41	2
	John Thune	5.76	2.41	0.63	0.51	2
	Jim Martin	4.51	2.42		0.43	2
	Charles Schumer	5.19	2.45	0.32	0.74	2

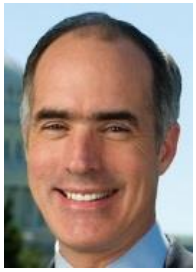
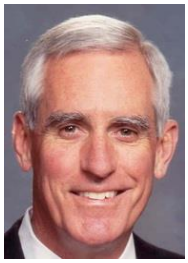
Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Ken Salazar	5.62	2.49	0.51	0.52	2
	Frank Vondersaar	4.04	2.58	0.33	0.12	2
	Bob Casey	5.55	2.58	0.08	0.59	2
	Pete Coors	5.28	2.69	0.49	0.48	2
	Joel Dykstra	5.28	2.72		0.38	2

Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Bob Bennett	4.67	2.80	0.24	0.70	2
	Chuck Robb	3.74	2.84	0.74	0.48	2
	Norm Coleman	5.25	2.84	0.33	0.51	2
	Saxby Chambliss	4.88	2.88		0.56	2
	Dick Zimmer	5.09	2.96		0.42	2

Photo	Candidate	Liking	Matching Score	Competence	Votes %	Group
	Pete Ricketts	5.48	3.43	0.39	0.36	2
	Brian Schweitzer	5.29	3.59	0.25	0.48	2
	Rocky Raczkowski	4.98	3.91	0.30	0.38	2