Evolution and Human Behavior 36 (2015) 8–16

Contents lists available at ScienceDirect

Evolution and Human Behavior

journal homepage: www.ehbonline.org

Original Article

Honest signaling in trust interactions: smiles rated as genuine induce trust and signal higher earning opportunities

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ARTICLE INFO

Article history:
Initial receipt 18 October 2013
Final revision received 5 August 2014

Keywords:
Honest signaling
Smiling
Experiment
Trust game
Video

ABSTRACT

We test the hypothesis that smiles perceived as honest serve as a signal that has evolved to induce cooperation in situations requiring mutual trust. Potential trustees (84 participants from Toulouse, France) made two video clips averaging around 15 seconds for viewing by potential senders before the latter decided whether to 'send' or 'keep' a lower stake (4 euros) or higher stake (8 euros). Senders (198 participants from Lyon, France) made trust decisions with respect to the recorded clips. If money was sent to the trustee, stakes were tripled and trustees could decide to keep all, two thirds or one half of the tripled stakes. Clips were further rated concerning the genuineness of the displayed smiles. We observe that smiles rated as more genuine strongly predict judgments about the trustworthiness of trustees, and willingness to send them money. We observe a relation between costs and benefits: smiles from trustees playing for higher stakes are rated as significantly more genuine. Finally, we show that those rated as smiling genuinely return more money on average to senders. An increase of one standard deviation in rating of smile genuineness is associated with an unconditional expected gain of about one dollar and thirty cents to senders in the two trials of the experiment. Potential gains for senders could be significantly increased from taking smiles rated as genuine into account.

1. Introduction

Smiling is a form of behavior that is found in all human societies and plays a central part in human communication (Darwin, 1872; Ekman, 1982; Niedenthal, Mermillod, Maringer, & Hess, 2010). There is scientific consensus that viewers perceive smiles as varying in their degree of "genuineness" or "convincingness". Since the work of Duchenne de Boulogne (1862) and Darwin (1872) many researchers have attempted to identify objective measures of honest smiles, concluding that genuine smiles are characterized by use of the *orbicularis oculi* (the muscle surrounding the eyes) in combination with the *zygomatic major* (raising the corners of the mouth); symmetry is also an important characteristic. More recent research focuses on the importance of temporal dynamics such as smile onset, apex, and offset durations (Krumhuber et al., 2007). Smiles perceived as genuine are not under straightforward voluntary control. Some individuals can make them more often and more easily than others, and all individuals find them easier to make when in certain affective states. Such states include a relaxed mood in general, and feeling well disposed to a communication partner in particular. Smiles also induce both conscious and unconscious mimicry (Niedenthal et al., 2010). Although individuals can smile when alone, smiling behavior seems to be a form of communication. But if so, what is it communicating, and why have we evolved a form of communication behavior that is under such imperfect conscious control?

A large literature exists in affective sciences concerning the identification of honest smiles (see for example Ekman, 2005; Ekman & Friesen, 1982) through coding of facial activity. Naive untrained observers correlate in their evaluations with categorizations by experts, but are far from reaching the same accuracy as experts. Since the effect of a signal depends on the perception of this signal by the receiver, we will in this paper focus on smiles that are subjectively 'perceived' as being genuine. We test the hypothesis that smiles perceived as genuine are an honest signal of cooperation opportunities for situations requiring mutual trust. We observe trust and trustworthiness behavior in a two person trust game where senders observed short video clips of trustees before taking their decisions. These video clips were further rated by participating senders in the study along a number of dimensions, among which the genuineness of the trustee's smile. We hypothesize that:

H1. Senders will be more willing to trust those trustees who are able to produce smiles rated on average as genuine.

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http://dx.doi.org/10.1016/j.evolhumbehav.2014.08.001

H2. Higher stake trust games will provoke more genuine smiles (as rated by all senders).

H3. On average, trusting those who produce smiles rated on average as more genuine, will lead to higher earnings for senders.

H1 is important in explaining why human beings should have evolved the habit of communicating in this way; there would be no point unless it succeeded in influencing the behavior of others. H2 is important in distinguishing the idea that smiles rated as genuine are an honest signal of some cooperation opportunity from two alternative views: first, that it is a form of costless communication that solves pure coordination problems (like "cheap talk"), and second, that it is not communication at all but merely an outward sign of an inner emotional state. H3 is important to explain why human beings should also have evolved the tendency to be influenced by the smiles of others. The evolutionary process by which smiling developed surely involved a good deal of repeated interaction between individuals who knew each other well, but like many other human adaptations, smiling may have been used opportunistically for interactions with strangers as these became more frequent in later history.

There exists some corroborating evidence for H1 and H3 in the literature. Schug, Matsumoto, Horita, Yamagishi, and Bonnet (2010) demonstrate that individuals who display relatively cooperative tendencies as proposers in an ultimatum game are more emotionally expressive in the face of unfair treatment by others than those who do not, including in the tendency to emit Duchenne as opposed to non-Duchenne smiles, which is consistent with H3. However, there is no test of any association between their emission of Duchenne smiles and their gestures of cooperation, and the sample is small (20 participants). Mehu, Grammer, and Dunbar (2007) suggest that human smiles are more prevalent in situations that involve sharing or exploitation of resources. By filming sixty pairs of friends during a neutral and a sharing decision they observe that significantly more Duchenne smiles are produced during sharing situations, thus situations requiring sharing elicit smiles and laughter (Mehu & Dunbar, 2008).

Whether trustworthy partners can be detected from still pictures is controversial and might depend on the moment when the picture was taken (Verplaetse, Vanneste, & Braeckman, 2007; Yamagishi, Tanida, Mashima, Shimoma, & Kanazawa, 2003) and whether trust evaluations are explicit or based on actions (De Neys, Hopfensitz, & Bonnefon, 2013). Efferson and Vogt (2013) report that viewing still pictures of men's faces does not lead to improved accuracy in predictions of trustworthiness. Dynamic pictures might in this respect be better (Brown, Palameta, & Moore, 2003). However Vogt, Efferson, and Fehr (2013) used short video clips of subjects in a variety of interactional settings that were not explicitly directed at a partner; other experimental subjects were not able to use these clips to infer trustworthiness.

H1 is the only one of the three hypotheses that has been tested directly, and has received significant support (Johnston, Miles, & Macrae, 2010; Scharlemann, Eckel, Kacelnik, & Wilson, 2001). Scharlemann et al. (2001) use still pictures and observe that participants trust more when seeing a smiling image of their partner. Johnston et al. (2010) use video clips and observe more trust in response to enjoyment smiles. In contrast to our study they test cooperation in a prisoners' dilemma (where non-cooperation is a dominant strategy, unlike in the trust game, where non-cooperation is the unique subgame perfect equilibrium strategy but is not a dominant strategy). They do so on the basis of comparison of only two clips, and cannot control for other differences between clips. Mehu, Little, and Dunbar (2007) assess what characteristics are associated with honest smiles by rating fifty faces across ten attributes. It turns out that Duchenne smiles play a significant role in the assessment of generosity and extraversion.

The phylogeny of smiling further suggests that it leads observers to behave less aggressively. The "horizontal silent-bared teeth" display (involving strong horizontal, as well as vertical, lip retraction; teeth and gums are exposed, but the mouth itself is closed) in non-human primates can be regarded as an analogue of our human smiling. It is assumed to have an appeasing or re-assuring function; its sender is usually the inferior partner; it may also be a signal in a process of negotiation between two individuals (Preuschoft & van Hooff, 1997). This suggests that in humans, smiling could serve as a kind of mimicry of submission, used by dominant partners to assure others that they will not abuse the opportunities for betrayal of the trust of others.

More generally faces seem to be consistently rated concerning their trustworthiness, which is mirrored by actions. van 't Wout and Sanfey (2008) observe that judgments of facial trustworthiness are related to sending money in a trust game. Trustworthiness ratings are also a significant predictor of how much money these players received in one-shot trust game, a finding replicated for repeated trust games (Chang, Doll, van 't Wout, Frank, & Sanfey, 2010).

Even though our investigation of perceived honesty of smiles as an honest signaling device is novel, a large number of studies in economics and psychology have in recent years investigated the importance of emotions in games. Inspired by results from affective sciences that emotions are not just some random noise but an essential part of the decision making mechanism (Damasio, 1994), theoretical and experimental work has investigated the effect of different emotions and other visceral factors on decision making (Elster, 1998; Frijda, Manstead, & Fischer, 2004; Kahneman, 2003; Ketelaar, 2006; Loewenstein, 2000) and the information conveyed by emotional display (Parkinson, 2005). Smiles are an expression of experienced happiness and might be used as a coordination device (Manzini, Sadrieh, & Vriend, 2009), but might also be an important component in social exchange (Owren & Bachorowski, 2001).

Signaling has been extensively studied both in economics since Veblen (1899) and Spence (1974), and independently in biology since Zahavi (1975). Signals have been defined as "an act or structure that alters the behavior of another organism, which evolved because of that effect, and which is effective because the receiver's response has also evolved" (Maynard Smith & Harper, 2003). A costly signal (or handicap) further imposes a cost on its bearer (a pecuniary or non-pecuniary effort cost in economics, a fitness cost in biology) by which reliability is ensured. Specifically it indicates the presence of some advantageous hidden trait because the signal is more difficult to send for those individuals who do not possess the trait than for those who do (Grafen, 1990). For an overview of different definitions, specifically concerning the type and size of costs and the type of information conveyed, see Maynard Smith and Harper (2003). We conjecture that the hidden trait associated with smiles perceived as honest could be an intrinsic characteristic of the smiler (such as her degree of altruism or tendency to display reciprocity as in Gintis, Bowles, Boyd, & Fehr, 2003), a medium-term state (such as good mood) or a characteristic of the situation in which the smiler finds herself (such as the size of the pie she is proposing to share). It could also be a combination of any of these.

To test our hypotheses we observe non-verbal behavior in an economic experiment involving trust. In a trust game first movers (called "senders") each decide whether to send a sum of money to a second player, called a trustee. If they do so the sum is tripled, and the trustee may divide this sum between himself and the sender. In our experiment, trustees made short video clips to be shown to senders before the latter took their decision. Participants knew that this was their only mean to convince their partner to trust them.

To detect whether an interaction partner can be trusted we can normally rely on third party information regarding the target individual's reputation (Sommerfeld, Krambeck, & Milinski, 2008), or use visual signals concerning the individual's character (Frank, 1988). Indeed it has been observed that players in trust games are willing to spend money relying on visual information of their partner (Eckel & Petrie, 2008). The kind of visual information used is however