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Can We Detect Cooperators by Looking at Their Face?

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Abstract

Humans are willing to cooperate with each other for mutual benefit—and to accept the risk of exploitation. To avoid collaborating with the wrong person, people sometimes attempt to detect cooperativeness in others' body language, facial features, and facial expressions. But how reliable are these impressions? We review the literature on the detection of cooperativeness in economic games, from those with protocols that provide a lot of information about players (e.g., through long personal interactions) to those with protocols that provide minimal information (e.g., through the presentation of passport-like pictures). This literature suggests that people can detect cooperativeness with a small but significant degree of accuracy when they have interacted with or watched video clips of other players, but that they have a harder time extracting information from pictures. The conditions under which people can detect cooperation from pictures with better than chance accuracy suggest that successful cooperation detection is supported by purely intuitive processes.

Keywords

cooperation, detection, face, games, intuition

Humans are not very fast, not very strong, and not very intimidating. Yet they have outclassed just about every other species and colonized just about every corner of land. This astounding success has been built upon a unique propensity to work cooperatively (Tomasello, 2014; Whiten & Erdal, 2012). All the way from coordinated hunting to the building of international space stations, humans have been willing to cooperate with each other for mutual benefit—and to accept the risk of exploitation. Indeed, to act cooperatively is to accept vulnerability to exploitation by selfish agents. Accordingly, people resort to various safeguards to protect themselves against cooperating with the wrong person (Cosmides & Tooby, 1992). These safeguards include first-hand information based on past interactions and second-hand information based on gossip or reputation. As a last resort, in the absence of relevant information, people can attempt to detect cooperativeness in others' body language, facial features, and facial expressions.

But how accurate are these impressions? Is it really possible to determine the cooperative intentions of a stranger after a brief interaction? Is it really possible to look at pictures of strangers and make appropriate decisions about trusting them? The question is not whether we can perfectly assess cooperative intentions just by looking at someone. We clearly cannot, or else scammers would all be out of business already. Rather, the question is one of signal to noise. Are we hopelessly inaccurate cooperation detectors, or do our judgments contain a kernel of predictive power, over and beyond the accuracy that would be expected by chance alone (Bonnefon, Hopfensitz, & De Neys, 2015; Olivola, Funk, & Todorov, 2014)?

In this article, we first introduce what we believe to be the most appropriate method for studying cooperation detection: economic games in which participants can look at their partners before making a decision to

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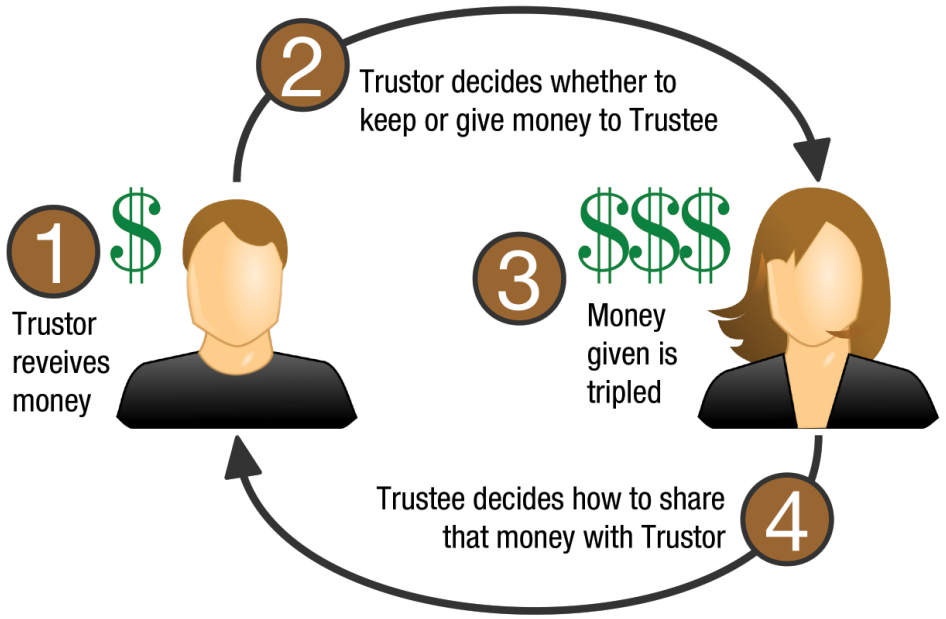

Fig. 1. The trust game, illustrated here, is used by social scientists to measure trust and reciprocity among anonymous strangers. Trustors can increase their earnings by transferring money to trustees, but trustees will face the temptation to keep the money. Accordingly, trustors should transfer the money only to trustees they expect to cooperate.

cooperate. This focus has several consequences for the kind of work we review in the rest of the article. First, we restrict our review to games in which cooperation is an applicable concept. Second, we limit our review to studies in which the detection of cooperation is the dependent variable (as opposed to, e.g., memory for faces of cooperators; Yamagishi, Tanida, Mashima, Shimoma, & Kanazawa, 2003). Third, we focus on the detection of actual cooperative tendencies rather than on the features that make a face look more trustworthy, attractive, or dominant, independently of the diagnosticity of these features.

Although economic games are traditionally played under strict anonymity, variants in which players can observe each other can be used to study cooperation detection. We review the evidence for cooperation detection in such economic games, moving from games with protocols that provide a lot of information about partners (e.g., through long personal interactions) to games with protocols that provide very little information (e.g., through the presentation of passport-like pictures). We conclude by considering the evidence for the intuitive nature of cooperation detection from faces.

Games

A major concern in the study of cooperation detection is using an objective, operational definition of what counts as a cooperative behavior and its detection. One solution is to use methods drawn from experimental economics, having participants play games with real financial consequences and rules that make it straightforward to characterize a decision as cooperative or not. In one such game, the trust game depicted in Figure 1 (Berg, Dickhaut, & McCabe, 1995),[1] a trustee who shares the money is cooperative (i.e., he or she displays positive reciprocity), and a trustee who keeps the money is not. If trustors were perfect cooperation detectors, they would transfer money to trustees who cooperate and keep the money when they play with trustees who do not cooperate. Accordingly, we can measure cooperation detection by recording how accurate trustors are in their decisions after they have had an opportunity to observe the trustee.

Another advantage of using economic games is that they may create especially favorable conditions for cooperation detection. First, money is at stake, which means that people have a real incentive to correctly detect cooperation—an incentive that would be missing if they were simply asked to rate how trustworthy random strangers look. Second, the rules of the game make it acceptable and legitimate to not trust the other player—whereas in daily life, there are social costs attached to treating another person as untrustworthy. Overall, economic games provide people with a motivation to detect cooperation and with a setting that makes it acceptable to demonstrate mistrust. These two factors improve lie

detection (ten Brinke, Vohs, & Carney, 2016), and they may improve cooperation detection, too.

Interactions and Videos

There is convergent evidence that if you give people ample time to interact with a partner face-to-face—say, for 10 to 30 minutes—they can predict whether he or she will cooperate with better than chance accuracy. This result was originally reported by Frank, Gilovich, and Regan (1993) using the prisoner's dilemma game (Axelrod, 1984) and was later replicated in other studies (Brosig, 2002; Reed, Zeglen, & Schmidt, 2012; Sparks, Burleigh, & Barclay, 2016). Of course, a lot of information can be gleaned from 30 minutes of face-to-face interaction: You get to see body language and facial dynamics, you can see and hear cues of emotion, you have an opportunity to listen to what your partner has to say, and you can even prompt you partner to discuss matters that might help you assess his or her trustworthiness. So, we know that people can extract some useful signals from this information-rich situation, but we need to ask how successful they are at doing so when they get less information.

For example, what if you can observe someone only while he or she is interacting with another person, without being an interaction partner yourself? Sylwester, Lyons, Buchanan, Nettle, and Roberts (2012) tried this with the prisoner's dilemma, showing participants either short or long video clips of other people interacting. ("Short" here means a few seconds, and "long" means 2 minutes, considerably shorter than the exposure time to partners in the studies we've considered so far.) Furthermore, the people in the clips were not idly chatting but actively trying to persuade each other that they would cooperate. Participants showed slightly better than chance accuracy in making predictions from the short video clips, but not from the longer clips. Using a very similar procedure, Belot, Bhaskar, and van de Ven (2012) reported better than chance cooperation detection for clips whose length varied from 6 to 25 minutes.

Now, what if you can see a clip of someone who is just introducing him- or herself, without interacting with anyone? Vogt, Efferson, and Fehr (2013) tried this with 20-second clips, which participants watched with the sound either on or off. The sound did not make a difference—participants showed slightly better than chance accuracy at detecting whether the person would cooperate in the prisoner's dilemma (but not in the stag hunt game; Skyrms, 2004), even if they could not hear what that person said. Comparably, Fetchenhauer, Groothuis, and Pradel (2010) found that participants showed better than chance accuracy at predicting behavior in the dictator game (Engel, 2011) after watching a silent 20-second clip of the players. In sum, although no meta-analysis has integrated all the evidence yet, the balance of evidence suggests that people can detect cooperation from dynamic facial displays. But what about static displays—that is, pictures?

Pictures

The evidence for cooperation detection from pictures is not entirely straightforward—in particular, and as we will discuss shortly, not any picture will do. To start with positive evidence, Verplaetse, Vanneste, and Braeckman (2007) reported better than chance detection of a player's cooperation in the prisoner's dilemma when they just showed participants his or her picture. One concern, though, is that this result was not replicated (using the same pictures and procedure) by Sylwester et al. (2012). Another concern is that detection was accurate only when the pictures were taken at the very moment the players made the decision to cooperate or not, not when they were taken before the game. This leaves open the possibility that participants picked up on some subtle emotional expression linked to that decision. Ideally, we would like to know whether people can predict the cooperation of another person from a picture of that person taken outside the context of the game.

Tognetti, Berticat, Raymond, and Faurie (2013) tried this approach, with an interesting twist. They took pictures of players of a public-goods game (Fischbacher, Gächter, & Fehr, 2001) in rural Senegal and tested whether urban French participants could detect the cooperativeness of the players based on these pictures—that is, they investigated whether cooperation detection from facial features could be achieved cross-culturally. They did find better than chance cooperation detection, but only for male faces, which complicates the interpretation of their results. Other studies have demonstrated some degree of cooperation detection in the trust game from still pictures, but the results either did not reach statistical significance (Eckel & Petrie, 2011) or could be attributed to other pieces of information that were leaked together with the pictures, such as whether the target player had been trusted by another person in the game (Efferson & Vogt, 2013).

Given these results, one could think that pictures are simply not informative enough to allow for cooperation detection. People can detect cooperation after personally interacting with or seeing (even brief, even mute) video clips of another person—but pictures do not give them enough to work with. It may come as a surprise, then, that cooperation detection can be improved by further degrading the informational content of the pictures.

Indeed, cooperation detection in the trust game springs back to better than chance levels when pictures are cropped and converted to grayscale, as illustrated in

Fig. 2. Cooperation detection based on static pictures is inconsistent—but degrading the informational content of pictures, as illustrated here, may increase accuracy. Full pictures can be cropped at the ears, eyebrows, and chin in order to display only inner features of the face. Makeup and skin tone can be de-emphasized by converting the picture to grayscale.

Figure 2 (Bonnefon, Hopfensitz, & De Neys, 2013; De Neys, Hopfensitz, & Bonnefon, 2013, 2015; Stirrat & Perrett, 2010). Why is that? One possible reason is that transformed pictures help people to focus on the signal (inner features) and ignore the noise (clothing, hairstyle, etc.). Another possible reason is that transformed pictures discourage people from thinking too much. The idea here is that just as the unconscious mind is better than the conscious mind at detecting lies (ten Brinke et al., 2016), intuitive processing may result in better cooperation detection than reflective processing.

Consider this finding from our research (Bonnefon et al., 2013): When people make decisions about whether to trust another person based on full, non-transformed pictures, their (inaccurate) decisions are perfectly predicted by ratings of how trustworthy the other person looks (as measured by asking this exact question to an independent sample of participants). But when people make such decisions based on transformed pictures, their decisions become more accurate while being far less correlated with these same ratings of how the other person looks. It thus appears as though full pictures prompt people to ask themselves the explicit question "How trustworthy does this person look?" and lead them astray as a consequence of this conscious processing—whereas transformed pictures discourage people from thinking too much and thus encourage them to follow their intuition, with better results.

If this interpretation is correct, then we should be able to find direct evidence that (successful) cooperation detection is based on intuitive processing. We will consider such evidence in the next section.

Intuitive Processing

When psychologists want to demonstrate that a behavior is driven by intuition, they can go through a standardized checklist of experimental tests inspired by dual-process theories (De Neys & Bonnefon, 2013; Evans, 2008; Evans & Stanovich, 2013; Pennycook, Fugelsang, & Koehler, 2015; Sloman, 1996). If a decision is driven by intuition, then people with better aptitudes for deliberate thinking (e.g., general intelligence) should not be at an advantage, and might even be at a disadvantage. And if a decision is driven by intuition, then it should survive (or even improve) under experimental manipulations that prevent people from thinking deliberately—either by forcing them to process information very quickly or by asking them to multitask so that they cannot focus their full attention on their decision.

Are smarter people better at detecting cooperation from transformed pictures? The answer is no. When we gave participants a classic intelligence test (Raven's Advanced Progressive Matrices; Bors & Stokes, 1998), we observed that participants with lower scores on the test detected cooperation just as well as participants with higher scores (Bonnefon et al., 2013).

Does multitasking impair cooperation detection from transformed pictures? The answer is no again. In the same study, we asked people to memorize either simple or complex patterns of dots while making their decisions. This dot-matrix task (Miyake, Friedman, Rettinger, Shah, & Hegarty, 2001) is useful because it allows researchers to vary the mental burden of participants, from negligible (memorizing simple patterns of dots) to highly consuming (memorizing complex patterns of dots). We found that participants under a highly consuming mental burden detected cooperation just as well as participants under a negligible mental burden (Bonnefon et al., 2013).

Future research will tell us whether cooperation detection also survives when participants have very little time to process pictures (Bonnefon, De Neys, & Hopfensitz, in press). Overall, the current evidence is consistent with the hypothesis that successful cooperation detection from pictures is driven by intuitive processing. Apparently, to detect cooperation in economic games, one does not need to be smart, one does not need to concentrate, and, in fact, one might be better off not thinking

too much. It will be important for future research to investigate the robustness of these findings as well as their boundary conditions.

Conclusion and a Word of Caution

Economic games are especially suitable for studying cooperation detection: They allow for a precise definition of cooperation and its detection, they provide financial incentives for accurate detection, and they make it socially acceptable to act on this detection. When people play economic games, they seem to extract useful information from the observation of their partners. This is especially true if they can interact with their partners or see them in video clips.

People have a harder time, though, extracting information from static displays such as passport-like pictures. What helps in this case is providing people with cropped pictures focusing on the inner features of the face. Under these conditions, the available evidence suggests that intuitive processes support successful cooperation detection with better than chance accuracy.

We should conclude with a word of caution. To say that people detect cooperation with better than chance accuracy when looking at other individuals, and that they do so by using their intuition, should not be taken as an encouragement to "go with your gut" when deciding whether someone should be trusted. The accuracy of face-based cooperation detection is better than chance but still very low, which means that accuracy can be easily washed in the social biases and prejudice that pervade facial impressions (Olivola et al., 2014; Todorov, Funk, & Olivola, 2015). That people show some measure of accuracy when assessing cooperation from faces is a scientifically important phenomenon, which we must investigate and understand—but we must be just as careful not to let this finding be unduly amplified in popular media or policy recommendations.

Recommended Reading

Bonnefon, J. F., Hopfensitz, A., & De Neys, W. (2013). The modular nature of trustworthiness detection. *Journal of Experimental Psychology: General*, *142*, 143–150. An experimental investigation of whether accurate trustworthiness detection is supported by intuitive processes.

DeSteno, D., Breazeal, C., Frank, R. H., Pizarro, D., Baumann, J., Dickens, L., & Lee, J. J. (2012). Detecting the trustworthiness of novel partners in economic exchange. *Psychological Science*, *23*, 1549–1556. An article about attempting to identify nonverbal cues of trustworthiness—and to implement them in robots.

Eckel, C. C., & Petrie, R. (2011). Face value. *American Economic Review*, *101*, 1497–1513. A comprehensive investigation of how much people are willing to pay to see their game partner, and what happens when they do.

Todorov, A., Olivola, C. Y., Dotsch, R., & Mende-Siedlecki, P. (2015). Social attributions from faces: Determinants, consequences, accuracy, and functional significance. *Annual Review of Psychology*, *66*, 519–545. A broader review of the inferences that people make from faces, with an emphasis on their unreliability.

Declaration of Conflicting Interests

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Note

1. There are many other games that are relevant to the current survey, such as the prisoners' dilemma, the stag hunt game, and the public-goods game; we review results obtained with all these games, but we do not describe them here for the sake of conciseness.

References

Axelrod, R. (1984). *The evolution of cooperation*. New York, NY: Basic Books.

Belot, M., Bhaskar, V., & van de Ven, J. (2012). Can observers predict trustworthiness? *Review of Economics and Statistics*, *94*, 246–259.

Bonnefon, J. F., Hopfensitz, A., & De Neys, W. (2013). The modular nature of trustworthiness detection. *Journal of Experimental Psychology: General*, *142*, 143–150.

Bonnefon, J. F., Hopfensitz, A., & De Neys, W. (2015). Face-ism and kernels of truth in facial inferences. *Trends in Cognitive Sciences*, *19*, 421–422.

Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behavior*, *10*(1), 122–142.

Bors, D. A., & Stokes, T. L. (1998). Raven's Advanced Progressive Matrices: Norms for first-year university students and the development of a short form. *Educational and Psychological Measurement*, *58*, 382–398.

Brosig, J. (2002). Identifying cooperative behavior: Some experimental results in a prisoner's dilemma game. *Journal of Economic Behavior & Organization*, *47*, 275–290.

Cosmides, L., & Tooby, J. (1992). Cognitive adaptations for social exchange. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind*. New York, NY: Oxford University Press.

De Neys, W., & Bonnefon, J. F. (2013). The whys and whens of individual differences in thinking biases. *Trends in Cognitive Sciences*, *17*, 172–178.

De Neys, W., Hopfensitz, A., & Bonnefon, J. F. (2013). Low second-to-fourth digit ratio predicts indiscriminate social suspicion, not improved trustworthiness detection. *Biology Letters*, *9*(2), Article 20130037. doi:10.1098/rsbl.2013.0037

De Neys, W., Hopfensitz, A., & Bonnefon, J. F. (2015). Adolescents gradually improve at detecting trustworthiness

from the facial features of unknown adults. *Journal of Economic Psychology*, *47*, 17–22.

De Neys, W., Hopfensitz, A., & Bonnefon, J. F. (in press). Split-second trustworthiness detection from faces in an economic game. *Experimental Psychology*.

Eckel, C. C., & Petrie, R. (2011). Face value. *American Economic Review*, *101*, 1497–1513.

Efferson, C., & Vogt, S. (2013). Viewing men's faces does not lead to accurate predictions of trustworthiness. *Scientific Reports, 3*, Article 1047. doi:10.1038/srep01047

Engel, C. (2011). Dictator games: A meta study. *Experimental Economics*, *14*, 583–610.

Evans, J. S. B. T. (2008). Dual-processing accounts of reasoning. *Annual Review of Psychology*, *59*, 255–278.

Evans, J. S. B. T., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on Psychological Science*, *8*, 223–241.

Fetchenhauer, D., Groothuis, T., & Pradel, J. (2010). Not only states but traits—Humans can identify permanent altruistic dispositions in 20s. *Evolution & Human Behavior*, *31*, 80–86.

Fischbacher, U., Gächter, S., & Fehr, E. (2001). Are people conditionally cooperative? Evidence from a public goods experiment. *Economics Letters*, *71*, 397–404.

Frank, R. H., Gilovich, T., & Regan, D. T. (1993). The evolution of one-shot cooperation: An experiment. *Ethology and Sociobiology*, *14*, 247–256.

Miyake, A., Friedman, N. P., Rettinger, D. A., Shah, P., & Hegarty, M. (2001). How are visuospatial working memory, executive functioning, and spatial abilities related? A latent-variable analysis. *Journal of Experimental Psychology: General*, *130*, 621–640.

Olivola, C. Y., Funk, F., & Todorov, A. (2014). Social attributions from faces bias human choices. *Trends in Cognitive Sciences*, *18*, 566–570.

Pennycook, G., Fugelsang, J. A., & Koehler, D. J. (2015). What makes us think? A three-stage dual-process model of analytic engagement. *Cognitive Psychology*, *80*, 34–72.

Reed, L., Zeglen, K., & Schmidt, K. (2012). Facial expressions as honest signals of cooperative intent in a one-shot anonymous Prisoner's Dilemma game. *Evolution & Human Behavior*, *33*, 200–209.

Skyrms, B. (2004). *The stag hunt and the evolution of social structure*. Cambridge, England: Cambridge University Press.

Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin*, *119*, 3–22.

Sparks, A., Burleigh, T., & Barclay, P. (2016). We can see inside: Accurate prediction of Prisoner's Dilemma decisions in announced games following a face-to-face interaction. *Evolution & Human Behavior*, *37*, 210–216.

Stirrat, M., & Perrett, D. (2010). Valid facial cues to cooperation and trust: Male facial width and trustworthiness. *Psychological Science*, *21*, 349–354.

Sylwester, K., Lyons, M., Buchanan, C., Nettle, D., & Roberts, G. (2012). The role of theory of mind in assessing cooperative intentions. *Personality and Individual Differences*, *52*, 113–117.

ten Brinke, L., Vohs, K. D., & Carney, D. R. (2016). Can ordinary people detect deception after all? *Trends in Cognitive Sciences*, *20*, 579–588.

Todorov, A., Funk, F., & Olivola, C. Y. (2015). Response to Bonnefon et al.: Limited "kernels of truth" in facial inferences. *Trends in Cognitive Sciences*, *19*, 422–423.

Tognetti, A., Berticat, C., Raymond, M., & Faurie, C. (2013). Is cooperativeness readable in static facial features? An intercultural approach. *Evolution & Human Behavior*, *34*, 427–432.

Tomasello, M. (2014). *A natural history of human thinking*. Cambridge, MA: Harvard University Press.

Verplaetse, J., Vanneste, S., & Braeckman, J. (2007). You can judge a book by its cover: The sequel. A kernel of truth in predictive cheating detection. *Evolution & Human Behavior*, *28*, 260–271.

Vogt, S., Efferson, C., & Fehr, E. (2013). Can we see inside? Predicting strategic behavior given limited information. *Evolution & Human Behavior*, *34*, 258–264.

Whiten, A., & Erdal, D. (2012). The human socio-cognitive niche and its evolutionary origins. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *367*, 2119–2129.

Yamagishi, T., Tanida, S., Mashima, R., Shimoma, E., & Kanazawa, S. (2003). You can judge a book by its cover: Evidence that cheaters may look different from cooperators. *Evolution & Human Behavior*, *24*, 290–301.