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Astrid HOPFENSITZ

Seeing and knowing others:
the impact of social ties on economic interactions

JURY

- Paul SEABRIGHT (Professor), Toulouse School of Economics

- Jean-Franois BONNEFON (Research Director), CNRS (Toulouse)

- Carsten de DREU (Professor), Leiden University

- Peter MARTINSSON (Professor), University of Gothenburg

- Manfred MILINSKI (Professor), Max Planck Institute

- Shaul SHALVI (Professor), University of Amsterdam

- Marie-Claire VILLEVAL (Research Director), CNRS (Lyon)

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1   Introduction

> ...an initiation into the love of learning, of learning how to learn, [...] as a matter of interdisciplinary cognition - that is, learning to know something by its relation to something else. (Bernstein, 1984)

My research interest is to understand the decision-making processes of economic agents. Decisions and how we come up with them are at the very heart of explaining economic behavior. According to traditional economic theory, decisions are the result of a logical process in which inputs are evaluated. However it has for long been accepted that emotions, feelings and other psychological factors influence our decisions (cf. Adam Smith in his The Theory of Moral Sentiments). In my thesis as well as my ongoing research I argue that emotions and other psychological factors influence behavior and that this influence is not just random noise but an essential part of the decision making process. Knowing about the influences of these factors will help us to understand and model economic behavior.

In my research I have concentrate on two kinds of choice situations. The first topic concerned the impact of personality and experienced and anticipated emotions on choice situation of monetary investment. This relates to important issues concerning saving and investment behavior of private and professional investors. In the following I will not focus on this work. Lately I have worked mostly on topics investigating which factors influence and create cooperation and trust in one-shot interactions. This relates to trust in anonymous market settings (i.e. the internet) and policy implications to increase contributions to public goods. Over the last years I had the chance to work on the topic of social ties in economic interactions that received financing from an ANR grant (JCJC). Studying social ties among families, friends, colleagues and neighbors

brings another often ignored dimension into the analysis of economic interactions. This document will review the literature on situations where economic agents know something about their interaction partner and discuss my own contributions.

To study the determinants of decision making in the situations I am interested in, it is necessary to observe behavior, choices and individual characteristics under controlled conditions. This can be best achieved in laboratory experiments where parameters can be held fixed. I have conducted a large number of experimental studies with different co-authors in different laboratory settings (Amsterdam, Geneva, Nottingham, Toulouse, Lyon). Results from these studies have resulted in a number of papers that I will present below. Many of these use novel experimental techniques or subject pools and have already been numerously cited in the literature (Web of Science citation report: 339; h-index: 8). Results have been regularly presented at international conferences in Europe and the US.

2   Motivation: why social ties?

Most economic interactions concern situations where two or more people meet and interact. A seller is approached by a buyer either on a market, in a store or over the internet. An employer bargains with his employee. A group of fishermen meets in the harbor before going on sea. During some of these interactions the involved parties might have a long history together and might know each other well. In other interactions the involved people might have never met before but see the face, dress and body language of their interaction partner. In again other situations they might not see each other but hear the other persons voice (over the phone) or see their photograph on a website (over the internet). The different pieces of information we gather about our interaction partners are used to help us build an image of him or her.

Psychologists have for long known that men are treated differently than women, that more beautiful and healthy looking individuals have an advantage and that we act differently with respect to people that look similar to ourselves compared to people that look foreign. Economists often treat such effects as biases that impede rational decision-making. As a results economists usually focus on situations where agents are anonymous and a number of policy recommendations concern methods to create anonymity, for example for job candidates.

In this document I will discuss the different ways in which information about the other might influence choices and the rational that might lie behind some of these behaviors. I will argue that many of these seeming biases might have evolutionary rationales that help humans make smarter decisions when interacting with others.

Indeed in some cases the influence might be due to us "learning" something about possible skills or abilities of our interaction partner (i.e. statistical discrimination). In other cases the influence might be due to an impact on our own concerns for this person (i.e. other regarding preferences). Again in other situations we might learn about the payoffs for the other and use this to predict how he will act (e.g. observing the others' emotions). And again in other situations the exchange of information will serve to create some common knowledge among the involved parties that can help to coordinate. Disentangling these different underlying motives is crucial for a good understanding of how social interactions influence human behavior.

The document will concentrate on five different dimensions in social interactions.[1] I will start with a discussion of social emotions and how they influence behavior in interactions. I will then turn to four dimensions of increasingly precise information about the interaction partner: reputation, visual cues, talking to the other and finally knowing the other. The last chapter will conclude and introduce my ongoing research.

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[1] Parts of this document have been previously published in Hopfensitz (2017).

3   Emotions: the social glue

3.1   Overview

Since my doctoral dissertation I have been interested in how emotions influence decisions in social interactions. In the following I will give an overview on the economically relevant literature on social emotions (see also Hopfensitz, 2006).

Anger is one of the emotions, most easily agreed on as being a basic emotion. Of the emotions that are considered as more or less basic, anger is also one of the most important for social interactions and a highly moral emotion (Haidt, 2003). The elicitation of anger is always related to the actions of another agent. If we get angry at the stone on which we were hurting our toes, this is mostly because we also ascribe some kind of agency to the stone (Ben-Ze'ev, 2000). Anger is also found to be primarily related to the appraisals of unfairness and immorality (Scherer, 1997). Anger and the avoidance of anger is part of almost any human interaction and consequently of major interest to economists when analyzing multiple player interaction. A better understanding of anger might help us explain, for example how and why cooperative behavior exists. Since anger might lead to a loss of control, its anticipation in others might lead to "nice" behavior. Anger is often seen as a negative emotion since it is unpleasant to the individual experiencing it. But eventually it might be a very "positive" emotion, by increasing respect and consideration for others. The relation of self-reported anger to reciprocity has already been observed in games where players can react to unfair behavior (Bosman and van Winden, 2002). Other studies have turned to using functional neuroimaging to study motivations for reciprocation of unfairness (Sanfey et al., 2003; de Quervain et al., 2004).

Moral behavior has been shown to be critically linked to the ability for emotional reactions (Anderson et al., 1999; Moll et al., 2002). While this is true for emotional

reactivity in general, of particular importance are emotions that facilitate prosocial behavior (prosocial emotions such as shame, guilt and empathic emotions, e.g. Bowles and Gintis, 2005). They do so by inducing a feeling of discomfort when doing something that violates one's values or norms, or those of other agents whose opinion one cares about. Shame and guilt are both 'self-reproach" emotions elicited by the individuals' own blameworthy actions (Ortony et al., 1988). While they differ in multiple dimensions concerning elicitation and action tendency, they have many similarities and are often elicited at the same time. It is often assumed that shame and guilt differ by the visibility of behavior. Shame is said to be triggered in social situations in which actions are seen by others, whereas guilt is more related to internalized values and hence is not influenced by the presence of others. However, research by psychologists has shown that people feel shame even when their actions are unobserved (Tangney et al., 1996), and that the experience of guilt varies considerably depending on the interpersonal context (Baumeister et al., 1994). The difference between shame and guilt seems to be mainly due to the focus. Guilt is felt when the focus is on the action, while shame is felt if agents feel that he or she is a "bad person" (Tangney and Dearing, 2002). Therefore the action tendencies of the two emotions differ. Since guilt is focused on behavior, the emotion can lead to compensation and to an active attempt to change the situation. Shame on the other hand can not lead to reparation, since it is implying that the person as such is bad. The action tendency of shame will be to hide and to get away from the situation. The difference between the emotions is that guilt can actually lead to appeasement, while shame might make matters worse. Finally, as with all emotions, the influence of prosocial emotions is twofold. First, the anticipation and wish for avoidance of shame and guilt might induce norm-abiding behavior. Second, the experience of shame or guilt, after an action, might lead to behaviors to diminish the feeling. In a social dilemma, this may happen through re-payment, future

cooperation or avoidance of future contact with the interaction partner. If the emotions are elicited through punishment of selfish behavior, they might inhibit retaliation and encourage individuals to act more cooperatively in the future.

3.2   Own contributions

My own work on emotions started with the projects of my doctoral thesis. As mentioned in the introduction I have at the same time studied the impact of emotions in individual choice situations and in social decisions. I will focus on the latter in this document.

The existence and enforcement of social norms is an important mechanism for the promotion of cooperation. As shown by a larger number of experimental studies over the last years, cooperative behavior can persist when there is an opportunity to punish defectors. This is leading to the question why punishment is used and through with mechanisms it leads to future cooperation. Emotions like anger about unfairness and shame about unjust behavior are likely to play an important role.

In a study with Frans van Winden, Gershon Ben-Shakhar and Gary Bornstein in the *Journal of Economic Psychology* (Ben-Shakhar et al., 2007), we investigated the importance of anger for the willingness to reciprocate unfair behavior. It has been previously shown that punishment of non-cooperative behavior can induce high cooperation levels. With our experiment we study specifically the motivations that might lead to such punishment. Since punishment is costly and interactions are anonymous, rational actors should not punish. One hypothesis is that the experience of anger leads people to disregard the costs of punishment for themselves and thus might explain the seemingly irrational decision to punish. In addition to self-reports of anger, we measured arousal of the participants by measuring the skin conductance level during the task. The results show that reported anger is related to arousal and anger is correlated

with the decision to punish. Meanwhile angry arousal is not necessarily elicited immediately after the action is observed, but is due to a process unfolding during the time period before the punishment decision has to be taken.

In a study with Ernesto Reuben published in the *Economic Journal* (Hopfensitz and Reuben, 2009), we investigated the role of emotions in an institution allowing for counter punishment, i.e. where someone who got punished can punish his punisher. In this study we show that the action tendency of anger can be countered by social emotions, as guilt and shame. These emotions are considered to be especially unique in humans and seem to be crucial to overcome social dilemma situations. We show that the effectiveness of punishment also depends on the emotional reaction of the individuals who are punished. If individuals feel anger after being punished, they might be motivated to retaliate towards the punisher. We observe that even though counter punishment is used by some subjects, the institution is effective and raises the cooperation level. This is due to the fact that many punished participants abstain from counter punishment; which can be explained by the experience of shame and guilt that inhibits the tendency to punish back after a norm violation. Indeed we observe that subjects that got angry from being punished and experienced shame and guilt, were more likely to abstain from punishment, than subjects not experiencing shame and guilt.

The role of forgiving a norm violation has lead to a further paper with Asimina Vasalou and Jeremy Pitt in the *International Journal of Human-Computer Studies* (Vasalou et al., 2008). In this paper we use the same paradigm as described above to investigate the practical applicability of a forgiveness institution for online interaction. We examine whether a victim's decrease in trust towards an unintentional or occasional offender can be repaired in an online setting, by designing an evaluating systems to support forgiveness.

4   Information and reputation

4.1   Overview

Social interactions have traditionally been modelled as games by economists. Such games can involve various people and can concern as different problems as cooperation (e.g. prisoners dilemma, public good game), competition (e.g. zero-sum games) or coordination (e.g. coordination games, battle of the sexes game). While a game concerns one interaction, obviously interactions between the same group of people might happen more than once. Thus players in a game might either have information from past interaction or anticipations concerning future interactions.

Game theory has traditionally distinguished one-shot games from repeated games. Repeated games in this context, mean interactions that have no clear end point and where after each interaction a positive probability of a future interaction exist. Since it is assumed that after the game is played, outcomes are revealed to the participating players, these future interactions will thus introduce concerns for reputation among all involved members. In contrast a one-shot interaction means, that after the game no future interaction between the involved parties is going to happen and thus no concerns for reputation or punishment can influence choices in this case. In many cases also any series of interactions that has a clear end-point of this type is treated similar to a one-shot interaction due to the principle of backward induction.

The experimental literature in economics has in this context mainly focused on situations where cooperation or helping in a game is possible (e.g. prisoners' dilemmas, helping and public good games). Cooperative acts are generally costly for the individual but provide a benefit for the receiver. In one shot interactions, such acts are from an individual point of view not beneficial. However in repeated interactions, strategies might be based on the previous choices by interaction partners and thus players that

previously cooperated will be rewarded in the future by further cooperation opportunities (Trivers, 1971). The superiority of such strategies was famously demonstrated by Axelrod in 1984 when matching various game strategies against each other in a tournament of repeated prisoners dilemma games (Axelrod, 1984). The clear winner of these studies was the very simple strategy of "tit-for-tat"; do to your partner as he has done to you in the past. Experiments have confirmed that direct reciprocity is a prominent strategy in settings where small groups of individuals interact repeatedly (Trivers, 1971; Binmore, 1992).

However in many settings groups are large and therefore interactions between the same two members are rare. In such settings indirect reciprocity might start to influence players interactions. Indirect reciprocity, concerns situations where an agent (i) has no first hand experience about another agents (j) behavior, but information about behavior by this agent (j) when interacting with a third party (k). Such information has been modelled as "image scores" (Nowak and Sigmund, 2005) i.e. a number that summarises an agents previous actions in a game. And indeed experimental studies have confirmed the idea that humans base their choices on the image score of their interaction partner.

A number of laboratory experiments have studied behavior when previous behavior by interaction partners is observable, specifically indirect reciprocity (e.g. Wedekind and Milinski, 2000; Milinski et al., 2002). Seinen and Schram (2006) studied the effect of observing the last six previous decisions made by an interaction partner in a helping game. In this game a "helper" can give some money to a "recipient" with the benefit being larger than the cost of giving. Since players were randomly rematched each period, the observed information was about interactions with a third party. Giving rates were significantly higher when it was common knowledge among players that information about previous round behavior would be available than in a control treatment

without this information. Also the amount of help received increased with the number of previous helpful choices made by a participant. Thus reputation is clearly taken into account by others, however reputation is also used strategically by agents that know that their reputation will matter in the future.

Whether such strategic motives are taken into account when seeing reputation information is another interesting question concerning indirect reciprocity. Engelmann and Fischbacher (2009) investigate this question in an experimental setting where agents had only in half of the periods an observable reputation score. In the remaining half of the periods strategic reputation building was thus not possible. About half of the participants can be classified as strategic, i.e. helping mostly in the periods where their behavior will be visible to others. Strategic reputation building also pays off. Participants playing strategically earn significantly more than players that are categorized as "weakly" strategic.

While most of these experiments are structured such that either only direct or only indirect reputation is available to participants, real human interactions are usually characterized by a mix of reputation information and first hand experience. The interaction of direct and indirect reciprocity has been studied by Molleman et al. (2013). In their setup participants in a helping game can either use information based on direct interactions or on reputation information. Not surprisingly, first hand experience is weighted stronger, especially when the two types of information provide conflicting evidence.

The importance of image scoring for real economic interactions is nicely illustrated by reputation systems created by various online communities. Most online communities provide the possibility to give publicly visible "grades" to previous interaction partners or to reward community members. A grading system is used on platforms as ebay, other platforms (as Wikipedia) use awards that can be given to others. The impact of receiving good grades or rewards on future interactions has been studied by

a number of different researchers. For example van de Rijt et al. (2014) studied how receiving one initial reward (controlled by the experimenters), influences the probability of receiving future rewards (from other users) for Wikipedia. To study this question a random sample of 208 Wikipedia editors among the top 1% of all editors (based on edit counts) were endowed by the researchers with a customized award. Ninety days later the editor pages of the 208 treated editors were sampled and compared to the pages of 313 non-treated editors that were initially similarly ranked. While 31% of the control editors received another award in this period, 40% of the treated editors received another award. However it is unclear whether these effects were due to an increase in motivation for the participants receiving positive feedback or solely based on the increased reputation score of these people. To control for this and to focus on situations that actually require some kind of cooperation, van Apeldoorn and Schram (2016) focused on ratings and behavior in an online community where members volunteer to host others (free of charge) that are travelling to their city. Specifically a number of artificial profiles was created that differed solely with respect to how many times the member had previously offered the service to others from the community. Ratings were therefore not a signal of trustworthiness of the member, but a sign of previous cooperative acts of the member. The studied online community had at the time of the study about 5.5 million members worldwide and can thus be considered a great success. As theories of image scoring would suggest the profiles that showed a history of previous contributions to the online community received more than double as many positive responses when sending out a request themselves, compared to a neutral profile.

The importance of reputation in public good situations is also illustrated by Yoeli et al. (2013) that study the willingness to participate in a campaign to prevent blackouts (SmartAC). This program aims at residents of Northern California to volunteer to

restrict their demand from central air conditioners on days of unusual high demand or unexpected plant failures. Participating in this program is voluntary and participants contribute at a cost of comfort to themselves to a public good of their community. The study varied whether participants were signing up for this program on sheets on which their own name and address was visible to others or where they signed up with an anonymous identifier. Observability tripled participation in the program. The effect was approximately seven times larger than offering a 25$ cash incentive. The effect was particularly large among people living in apartments (compared to houses) and for owners (compared to renters). This is in line with the idea that reputation should matter especially in situations where interactions are frequent or repeated for a long time, as is the case of inhabitants of an apartment block or residents that bought their home.

4.2   Own contributions

In my own work I have concentrated on situations where no direct reputation information is available but where information about the group identity of the interaction partner is made known. This information allows players to have more precise predictions about their partners actions and preferences.

In collaboration with logicians and computer scientists, I have been involved in a logical analysis of interactions by participants knowing the group identity of the other, without being able to identify the other concretely. The developed model and its predictions is discussed in Attanasi et al. (2014) and Hopfensitz et al. (2014). We also conducted an experimental project to test some of these predictions. The paper was recently published in the *European Economic Review* (Attanasi et al., 2016). Results from this project suggest that (subjective) social ties crucially influence behavior in coordination games where a group goal is in conflict with an individual goal. Partic-

ipants interacted in games in which we varied the degree to which they were tied to their interaction partners. Specifically we study the impact of social ties on behavior in two types of asymmetric coordination games. Social ties are varied by making players interact with partners from different in-groups (fellow members of their own sports team, members of their sports club, students of their university). In addition to this "objective" manipulation, we also elicited subjective evaluations of the degree to which participants considered the group as well interconnected. We find that smaller and more salient in-groups lead to significantly more group beneficial choices. The same effect is observed for players that report high values of their subjective social ties. The paper discusses how these results relate to the idea that socially tied individuals follow some group beneficial reasoning.

A second line of projects that studied the reaction to interaction partners from a specific group are collaborations with Pepita Miquel-Florensa (Toulouse School of Economics) and Cesar Mantilla (IAST) to investigate the importance of joint group membership and the resulting joint social ties on economic behavior for real economic agents, namely coffee farmers and fishermen. During a first part of the project we conducted controlled laboratory experiments with coffee farmers in Costa Rica to investigate the impact of their group membership on cooperation and trust in an abstract laboratory experiment. Results from this study were published in the *Journal of Institutional Economics* (Hopfensitz and Miquel-Florensa, 2017).

The paper analyzes how Costa Rican coffee farmer's behavior in an experimental public good game depends on the institutional structure of the farmers buying point (cooperative vs. privately owned mills), and on the background of their game partners (partners selling to the same type of mill or not). We find that cooperative farmers do not display more public good orientation than private market farmers when playing with partners from the same type of mill. However, even though farmers sell-

ing to private mills make no difference with respect to the background of partners, farmers selling to cooperatives significantly decrease contributions when paired with non-cooperative members. We also study how self-selection into a mechanism that punishes the lowest contributors effects contributions both inside the group and with partners of the opposite background, and we show that it increases contributions by cooperative farmers interacting with non-cooperative farmers by more than 100%.

5 Seeing the other

5.1 Overview

Is the used car seller going to cheat me? Is the employee going to be able to perform the required tasks? Is the creditor going to pay back his loan? Many immediate questions in social interaction turn around the expected behavior by others. Behavior might be due to a specific strategy followed by the other or due to constraints and abilities of the other. Collecting information about an interaction partner has very often the goal of informing us about likely behavior by the other. When no verifiable information is available, people often use statistical extrapolation to infer likely behavior. If women or foreigners are more likely to posses a specific trait, seeing a woman or hearing a foreign name might trigger beliefs that this specific person is also going to have these traits. Statistical discrimination is most likely to occur with respect to groups that have a clear reputation and where group membership can be easily observed. Not surprisingly the literature of statistical discrimination has mainly focused on gender and race. Both gender and race are easily deduced from seeing or hearing another person and even more abstract information like the persons name, handwriting or address can be used. However seeing or hearing another person also leads us to use the "non-verbal" communication transmitted by gestures, mimic or tone of voice to anticipate the interaction partners behavior. Studying these impacts is especially interesting for economists that traditionally tend to consider such information to be either "cheap talk" (i.e. messages that are aimed at convincing the other party to do something, with no real commitment behind) or as uninformative noise. However people are surprisingly consistent in evaluations of others based on seeing them and there is now increasing evidence that they are also better than chance in predicting the true underlying strategies that will be used by the other player (in certain interaction

settings).

The most commonly investigated setting, concerns the judgment of other peoples trustworthiness. Specifically if we assume that trust is increasing overall welfare, but can get exploited by untrustworthy others, individuals that can detect trustworthiness will have an advantage over those that can't. Interesting evidence for a real world application of this ability is a study on vote buying behavior in Paraguay (Finan and Schechter, 2012). In many countries where ideological differences between parties are small, vote buying can have a large importance for election outcomes. Vote buying describes the exchange of small personal gifts against a promise to vote for a specific party. If votes are anonymous the person "buying" the vote thus has to believe that the promise will be kept. Thus it is in a candidates" interest to focus on those voters that are likely to reciprocate the gift. Finan and Schechter investigate data from a household survey and a middleman survey (those that actually do the vote buying for politicians) for the case of Paraguay. Based on the household survey, reciprocity was measured for voters based on the share they returned as second mover in a trust game. This measure of reciprocity was significantly influencing the probability that this individual was offered something in exchange for their vote. Thus middle men seem able to detect reciprocal individuals and use this information when targeting their vote buying activities.

Trustworthiness judgments based on seeing human faces are fast. When seeing a face for less than 100ms, ratings are essentially the same as when given unlimited time to look at the face (Willis and Todorov, 2006; Todorov et al., 2009). Generally photographs of faces seem to be consistently rated concerning their trustworthiness, i.e. people in general agree on what a trustworthy face looks like. And already 5 to 6 year old children, are at the level of adults' consistency (Cogsdill et al., 2014). Agreement can also be observed across cultures. Rule et al. (2010) asked American and Japanese

participants to rate faces of U.S. and Japanese political candidates. Ratings of faces showed large agreement, regardless of culture.

Trustworthiness judgements, based on facial features also influence real choices. For example the decision to send money to the depicted person in a trust game (van't Wout and Sanfey, 2008). In this one shot game, one player is endowed with a sum of money, and informed that he has the opportunity to transfer part of that money to another player. If he does so, the amount she transfers is multiplied by a factor (e.g. 3) and given to the second player. The second player can now choose to transfer back some of this multiplied amount. The first players decision thus amount to deciding whether he will trust the other player with his money.

The effect persists to influence choices even after direct experience. In a repeated setup, initial trustworthiness ratings were observed to be updated by own experience but keep influencing decisions even after multiple rounds (Chang et al., 2010).

The facial features influencing character ratings are often triggered by cues that carry some valid information about the person: for example facial symmetry as a signal of fitness (Zebrowitz and Rhodes, 2004). However conclusions about the actual information content of such signals have to be often critically viewed. For example facial width to height ratio is often referred to as a signal of aggressiveness (Carre and McCormick, 2008; Stirrat and Perrett, 2010) however recent data has been questioning this relationship (Deaner et al., 2012; Gomez-Valdes et al., 2013).

Whether actual trustworthiness can be reliably detected from faces is still controversial (Yamagishi et al., 2003; Verplaetse et al., 2007; Efferson and Vogt, 2013). Trustworthiness detection might be based on signals about the thought process or preferences of an actor that are mirrored in his face while contemplating the choices. For these kinds of signals it is necessary to study the effect of photographs or movies taken while the interaction partner takes his decision. And indeed some studies have ob-

served this ability (Verplaetse et al., 2007; Willis and Todorov, 2006). Trustworthiness detection might also use cues that are related to the interaction partners' personality and general disposition to be trustworthy. In this case any kind of observation about the other should carry useful information. We will get back to this in the next section.

Strongly related to trustworthiness judgments, are the expressed emotions in a persons face. Specifically smiling faces (photos and videos) elicit high trust. Scharlemann et al. (2001) used still pictures and observed 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. Enjoyment or "genuine" smiles are not under straightforward voluntary control. 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).

Mehu et al. (2007) assess which 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.

Concerning situations requiring trust, non-verbal communication might thus be informative with respect to personality characteristics, the current decision process of the decision maker and to the constraints that the decision maker is facing. Trust evaluations are mainly influential for situations in which contracts cannot be enforced and thus were penalizing a norm or contract violator is not possible. Another problem arises in situations where punishment is possible. Indeed punishment of norm violators that free-ride on others has been observed to be a very powerful instrument to motivate

pro-social behavior (Fehr and Gaechter, 2000). However punishment can also lead to welfare losses (Egas and Riedl, 2008), especially if punishment is unconstrained and those that feel treated unfairly can retaliate with counter-punishment (Nikiforakis, 2008). Punishment in these settings is usually costly to the individual punishing and can thus not be explained from an own material welfare maximizing point of view. However norm violations have been observed to very reliably trigger emotions. An ability to detect an interaction partner's disposition to feel such emotions might thus be informative to judge the "probability" of being punished. The ability to judge an interaction partners costs and abilities for punishment might be informative to judge the potential expected "damage" from punishment. The two dimensions seem not uncorrelated. Sell et al. (2009) hypothesize that individuals with enhanced abilities to inflict costs have a better bargaining position in conflicts and consequently they might be more prone to anger.

The face seems to carry information that enables participants to detect who will reject a low offer in an ultimatum game (van Leeuwen et al., 2017). The same study observed that own facial asymmetry is positively correlated with getting angry after receiving a low offer, as well as with the decision to reject a low offer. Furthermore observers correctly perceive facial asymmetry as a cue for getting angry after norm violations, though they underestimate the magnitude of the correlation.

5.2 Own contributions

In my own work I have focused on the question of how trust in an interaction partner is influenced when some (visual) information about the partner is provided. These questions were investigated by a number of research projects that were financed through my ANR grant on the influence of social ties in economic interactions.

We specifically studied the identification of partners in a trust game through pic-

tures and movie sequences. Partners in economic trust games are usually completely anonymous and if they are identifiable (e.g. by partners revealing their identity) the information transmitted is not specifically analyzed. We created an experimental setup in which second movers in the trust game were asked to send a video message to first movers. While the partner in the trust game became thus identifiable, interactions stayed anonymous since participants were from different places in Europe and could not find out who their actual interaction partner was. We analyze at the same time the information carried in the visual signal of the movie clip, as the parameters that influence first movers decision of trust.

The importance of smiles in such interactions and the signaling role of such smiles is discussed in (Centorrino et al., 2015a) published in *Evolution and Human Behavior* and (Centorrino et al., 2015b) published in *Adaptive Human Behavior and Physiology*.

Specifically 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.

While this project focused on movie sequences, we studied still pictures in a series of experiments with psychologists Jean-Francois Bonnefon and Wim de Neys. In a first paper we investigated the modularity of trustworthiness detection from photographs and the factors driving trustworthiness detection (Bonnefon et al., 2013).

Specifically it has been conjectured that people of higher intelligence are better able to detect signs of untrustworthiness from potential partners. In contrast, our article reports five trust game studies suggesting that reading trustworthiness of the faces of strangers is a modular process. Trustworthiness detection from faces is independent of general intelligence and effortless. Pictures that include non-facial features such as hair and clothing impair trustworthiness detection by increasing reliance on conscious judgments, but people largely prefer to make decisions from this sort of pictures. In sum, trustworthiness detection is a genuine and effortless ability, possessed in equal amount by people of all cognitive capacities, but whose impenetrability leads to inaccurate conscious judgments and inappropriate informational preferences.

We then discuss the role of markers as the second-to-fourth digit ratio in the ability for trustworthiness detection in De Neys et al. (2013). Testosterone administration appears to make individuals less trusting, and this effect has been interpreted as an adaptive adjustment of social suspicion, that improved the accuracy of trusting decisions. In our paper, we consider another possibility, namely that testosterone increases the subjective cost of being duped, decreasing the propensity to trust without improving the accuracy of trusting decisions. In line with this hypothesis, we show that second-to-fourth digit ratio (2D:4D, a proxy for effects of testosterone on the foetus) correlates with the propensity to trust, but not with the accuracy of trusting decisions. Trust game players (N = 144) trusted less when they had lower 2D:4D (high prenatal testos-

terone), but their ability to detect the strategy of other players was constant (and better than chance) across all levels of digit ratio. Our results suggest that early prenatal organizing effects of testosterone in the foetus might impair rather than boost economic outcomes, by promoting indiscriminate social suspicion.

In a paper in the *Journal of Economic Psychology* (De Neys et al., 2015) we then investigate the development of this ability in adolescents. We focus on situations in which adolescents make a decision whether to trust an unknown adult. Adolescents aged 13 to 18 (N = 540) played a trust game, in which they made decisions whether to trust unknown adults based on their picture. We show that trusting decisions become increasingly accurate with age, from a small effect size at age 13 to an effect size 2.5 times larger at age 18.

Results from these studies and implications for trustworthiness detection are further discussed in Bonnefon et al. (2015), Bonnefon et al. (2017a) and Bonnefon et al. (2017b).

6 Talking to the other

6.1 Overview

When agents talk many things happen. Most obviously information is transmitted from the speaker to the listener. But this information might consist in much more than in the meaning of the words that are exchanged. The tone of the voice might carry many additional signals. That these signals are informative and detected by others has been observed for the voice of women over the menstrual cycle. Pipitone and Gallup (2008) recorded voice samples by women at different moments of their menstrual cycle. Results showed a significant increase in voice attractiveness ratings as the estimated risk of conception increased across the menstrual cycle in naturally cycling women. In line with this, there was no effect observed for women using hormonal contraceptives. While men find higher pitch voices in women to be more attractive, feminine and healthier (e.g. Feinberg et al., 2008), women have been observed to find men with low pitch to be more attractive (e.g. Collins, 2000). Lower voice pitch in men has even been observed to be related to higher reproductive success in a population of hunter gatherers (Apicella et al., 2007). Preference for low pitched voice in men has also been observed with respect to political candidates (Tigue et al., 2012) and might influence behavior in many other circumstances.

In addition to the explicit and implicit information transmitted by speech, public announcements might be even informative when all implied parties already had the announced information. Specifically speech is very well suited to generate common knowledge. Not only does each agent posses some information, but also all agents know that all the others have this information and that these others know that others also have the information and so on... Common knowledge is especially useful in coordination games. In a coordination game Alice will try to act the same way as

Bob. But at the same time she knows that Bob will try to act the same way as Alice. To break through this cycle, information that is common to all players might act as a coordination device. Many real life situations involve coordination. And what might otherwise be considered as not-informative communication (for example advertising) might indeed serve to create common knowledge. Advertising broadcasted during SuperBowl (i.e. advertising that many people will see and that people know that many others will see) comes especially often from products that would profit from common knowledge (e.g. a new technology that is only interesting if also many others use it, see Chwe, 2013).

Having heard someone speak something out loud, further informs us about how committed the person will be in the future to do as he or she said. Most people are much more likely to stick with a decision once it has been announced loudly. Reasons are a motivation to keep a reputation of being consistent and reliable, but also an avoidance of situations generating cognitive dissonance. This has been modelled by economists as "guilt aversion". I.e. the anticipation of feeling bad after breaking a promise and the subsequent tendency to stick with what was said during cheap talk (e.g. Charness and Dufwenberg, 2006; Charness and Grosskopf, 2004). Ideally the study of cheap talk concerns "how people skeptically, but reasonably and mostly conventionally, interpret language. It is the study of rational people who know how to communicate in the ordinary way." (Farrell and Rabin, 1996). And this implies that messages that are "cheap" (i.e. by not influencing the players payoffs) can nevertheless influence players choices in what they communicate and how they react to it. And this can, in turn, influence also payoffs.

6.2   Own contribution

I recently started investigating the importance of communicating in different strategic environments. In this project with Aljaz Ule we focus on symbolic communication that ex-ante is void of meaning. Specifically we know that face to face, free form, or restricted communication improve coordination and cooperation in simple experimental games. In typical experimental studies subjects are offered a commonly understood communication medium and often use it to increase economic efficiency. Here we investigate whether communication increases efficiency even when there is ex-ante no common meaning, and whether it may endogenously emerge. Experimental subjects repeatedly play economic games with strangers, and may exchange abstract symbols during each game. We see that symbolic exchange increases coordination and cooperation. We then investigate whether groups of strangers assign the same meaning to the same symbol and observe that this is more likely to happen in difficult economic games. We conclude that an economic challenge motivates emergence of meaningful communication.

In another recent collaboration with anthropologists and linguists (Arnaud Tognetti and Melissa Barkat-Defradas) we will study markers in voice samples of participants in a two player Public Good game. Choices in the public good game were either conditional or unconditional and thus allow us to disentangle conditional from unconditional cooperators. Each participant further recorded multiple voice samples that either consisted in repeating a given sentence or speaking freely. Initial analysis suggests that pitch variation in the voice samples is negatively correlated with contributions to the public good.

7   Knowing the other

7.1   Overview

Besides hearing gossip, seeing and talking with others, most importantly we "know" many of the agents we interact with. This knowing implies that we have information about preferences, skills and habits of the other with much less error proneness than from the previously discussed indirect channels. Note that these translate into information about the others' payoffs for different outcomes (preferences), his or her strategy set (skills) and the to be expected strategy (habits). However knowing the other player will also influence our own preferences. As when we play with someone we really care about (and thus his utility will positively influence our utility) versus interacting with someone we dislike (with an inverse relationship between utilities). We thus have to differentiate between interactions between unknown players and between players that have a history of previous interactions. Having such "social ties" does not necessarily imply that the players will cooperate more or trust each other more. Dependent on the previous interaction history, a novel interaction will be influenced in one or the other way (e.g. van Dijk and van Winden, 1997). The valuation of others has been observed to be positively influenced for example by a history of successful interactions in a public good environment (van Dijk et al., 2002).

Harm done to someone we care about can feel like harm to ourselves. So-called 'mirror neurons' can lead for people with strong social ties to emotional experiences very similar to the actual experience of an observed person (Singer and Frith, 2005; Singer et al., 2004). For example when one partner of a couple received slight electric shocks, neuroimaging confirmed that actual pain was experienced by the observing partner. Thus what economists call "other regarding preferences" might indeed be reinforced by biological factors making the others pain our own.

While obviously we are influenced where our interaction partner is a friend, colleague or acquaintance, similar mechanisms are at work when we interact with a person from a specific group that we know. This "in-group" versus "out-group" bias has received much attention in economics and psychology. The observation that such biases exist even in situations where grouping is more or less arbitrary, lead to the development of the so-called "minimal-group paradigm" (Tajfel et al., 1971). Indeed the work by Tajfel and co-authors was initially aiming at studying behavior between "meaningless" groups to be able to sequentially add relevant group information in order to find which characteristics actually lead to discrimination between groups. The surprising finding was, that even when group identity is based on quasi-arbitrary allocation (e.g. picture preferences or a coin flip), group discrimination was observed. Since then, the paradigm has been used in a multitude of studies to investigate the mechanisms of group discrimination (e.g. Brewer, 1979,9; Tajfel and Turner, 1979; Yamagishi and Kiyonari, 2000). Evidence now converges to the insight that biases are mainly leading to in-group favoritism and less often to out-group punishment and such behavior has been linked to the presence of the neuropeptide oxytocin.

"Oxytocin plays an important role during and after childbirth, facilitating birth, maternal bonding, and lactation. Oxytocin has been observed to play a role in pair bonding and situations requiring mutual trust and is therefore sometimes referred to as the 'bonding hormone'. In studies on minimal groups, oxytocin has been observed to lead to a 'tend and defend' response in that it promoted in-group trust and cooperation, and defensive, but not offensive, aggression toward competing out-groups" (De Dreu et al., 2010). Thus a biological mechanism linked to bonding is through its impact on in-group favoritism also causing intergroup biases. Favoritism easily triggers negative emotions and protest in those that feel disfavored and thus oxytocin might trigger a chain reaction leading to between group conflict. Ethnocentrism is thus to a certain

degree the result of an adaptive process that helps individuals and their groups, but that unfortunately has also negative consequences by generating intergroup bias and conflict (De Dreu et al., 2011).

A very specific group of interaction partners, are members of our own family. Biology and anthropology has for long studied the theoretical and actual interactions between genetically related individuals, but also family economics has in recent years departed from the traditional view that a household is simply "one" economic decision maker. Economic models are traditionally much less concerned with the actual genetic relatedness but see the household as a social structure based on institutions like marriage and legal contracts. The biological approach is mainly based on the concept of kin-selection, i.e. that individually costly behavior might benefit the individuals' genes if beneficiaries are genetically related. Hamilton's rule popularized this concept in mathematical terms and specifies that genes can increase in frequency when the genetic relatedness of a recipient to an agent multiplied by the benefit to the recipient is greater than the reproductive cost to the agent. Kin selection is often cited when explaining individual costly altruistic behavior. Helping others at a cost or fighting to protect the life of others, might be thus costly for the individual but the cost is outweigh by the benefits to the individuals genes carried in those that receive the help.

If "genetically related" is thus generating one sort of group, the corresponding outgroup can be seen as those that are "not-genetically related". While this concept is obviously less clearly defined, since even with individuals that are not direct relatives we do share a majority of our genes, it nevertheless can influence behavior. Specifically reproduction partners should ideally be no close relatives, as so called "inbreeding" increases the chances of offspring being affected by recessive or deleterious traits. And indeed portraits that are modified such as to seem "less" related to the individual are generally rated as more attractive (DeBruine et al., 2011). Also the body smell of indi-

viduals with dissimilar genotypes has been observed to be preferred. This mechanism is linked to a set of genes (the major histocompatibility complex (MHC)) that plays an important role in the human immune system. Humans have been shown to prefer the body odor of potential partners that have a different MHC, which will thus result in offspring benefiting from two different types of immune systems (Wedekind et al., 1995). The impact of this preference can be also observed with respect to artificial smells, like perfumes. Notably large individual differences concerning perfume preferences exist among humans. These preferences are also remarkably stable over the lifetime. When participants are asked to report for perfumes whether they would like to use them for themselves, ingredients in the preferred perfumes have been shown to imitate and enhance signals from the persons' natural smell (Milinski and Wedekind, 2001).

Family members are obviously a combination of people that are closely related to us (parents, siblings and children) but also unrelated individuals (our partner and the partners of our siblings and children). That nevertheless all family members are part of a specific group is related to legal and cultural constraints that apply to it. Family members have specific rights but also obligations with respect to each other. Consequently economists have for long modelled the family as one decision making unit, without investigating how preferences or choices of a family come about. Specifically most models assume that a household is able to reach a Pareto efficient allocation, i.e. that it is not possible to find another allocation that could increase simultaneously the welfare of all household members. Relatedly many models assume that households do "income-pooling", i.e. the income of all household members is pooled and then allocated to its members according to a household specific sharing rule. Experimental evidence is now suggesting that households do not always reach efficient outcomes and that they do not always aim at maximizing the households income pool (for a survey

see Munro, 2017). Relatedly sociological studies often confirm that family members have often conflicting preferences. Contributions in a public good game are for example observed to be higher among family members than among strangers but not at the full level of cooperation (e.g. Peters et al., 2004). And spouses were more willing to invest in a public good when they considered themselves as having more control over the final allocation across partners (Mani, 2010).

7.2 Own contribution

In a series of experiments I have studied situations related to trust and cooperation in households.

In a first study with Helene Couprie and Francois Cochard published in the *Review of Economics of the Household* (Cochard et al., 2016) we observed behavior in a social dilemma played by spouses. We present results from an economic experiment conducted with 100 co-habiting heterosexual couples. We compare defection behavior in the prisoner's dilemma within real couples to pairs of strangers. One out of four participants chose not to cooperate with their spouse. To understand why spouses might prefer defection, we use a novel allocation task to elicit the individual's trade-off between efficiency and equality within a couple. We further investigate the impact of socio-demographic and psychological characteristics of the couples. We find in particular that lack of preferences for joint income maximization, having children and being married lead to higher defection rates in the social dilemma.

A follow up study concerning behavior of spouses has been conducted in 2010 financed through a Franco-German ANR grant and lead to an intercultural comparison of the tradeoff of efficiency versus equality in the two countries (Beblo et al., 2015). The paper presents the results of an experiment measuring social preferences within couples in a context where intra-household pay-off inequality can be reduced

at the cost of diminishing household income. We measure social norms regarding this efficiency-equality trade-off by reported beliefs about the behavior of peers, and we implement a cross-country comparison between France and Germany. In particular, we show that German households are more income-inequality averse and thus less income-maximizing than French households. Decomposition reveals that diverging sample compositions in the two countries drive less than half of the difference, while over half of the initial French/German difference remains unexplained. Beliefs differ significantly from observed behavior in both countries. Income-maximizing choices are overestimated in the German sample and underestimated in the French.

Further data from this second study concerns the contributions to a joint public good for the family when the experimental setting required real effort investment and allowed for a leisure option. The corresponding paper (Cochard et al., 2017) is forthcoming in *Experimental Economics*. The aim of the project is to investigate specialization by men and women in a household. Female specialization on household work and male specialization on labor-market work is a widely observed phenomenon across time and countries. This absence of gender neutrality with respect to work-division is known as the "work-division puzzle". Gender differences regarding characteristics (preferences, productivity) and context (wage rates, social norms) are generally recognized as competing explanations for this fact. We experimentally control for context and productivity to investigate preferences for work-division by true co-habiting couples, in a newly developed specialization task. Efficiency in this task comes at the cost of inequality, giving higher earnings to the "advantaged" player. We compare behavior when men (or women) are in the advantaged position, which corresponds to the traditional (or power) couple case where he (or she) earns more. We show that women do not contribute more than men to the household public good whatever the situation. This result allows us to rule out some of the standard explanations of the work-division

puzzle.

Finally in a recent project with anthropologist Jon Stieglitz (Stieglitz et al., 2017), we used the distribution task to study choices in a subsistence population (namely the Tsimane of Bolivia). Using this experimental distribution task stipulating a trade-off between household efficiency and spousal equality in allocating surpluses of meat and money, we examine factors influencing spousal distribution preferences among Tsimane forager-horticulturalists of Bolivia (n = 53 couples). Our primary goal is to understand whether and how access to perfectly fungible and liquid resources (which increases with greater participation in market economies) shifts intra-household distribution preferences. We hypothesize that greater fungibility of money compared to meat results in greater squandering of money for individual fitness gain at a cost to the family. Money therefore requires costly strategies to insure against a partner's claims for consumption. Whereas nearly all Tsimane spouses prefer efficient meat distributions, we find a substantially reduced efficiency preference for money compared to meat controlling for potential confounders. Reported marital conflict over paternal disinvestment is associated with a nearly 13-fold increase in odds of revealing a selfish money distribution preference. Selfish husbands are significantly more likely than other husbands to be paired with selfish wives. Lastly, Tsimane husbands and wives are more likely than Western Europeans to prefer an efficient money distribution, but Tsimane wives are more likely than Western European wives to exhibit a selfish preference. In sum, preferences for the distribution of household production surplus support joint and separate interests views of marriage; a hybrid approach best explains how ecological-, family-, and individual-level factors influence spousal preferences through their effects on perceptions of marginal gains within and outside the household.

8   Conclusion and future work

8.1   Conclusion

Gossip, seeing, hearing and knowing our interaction partner is often dismissed by economists as uninformative noise or cheap talk. In this document I have tried to give an idea of why many of the influences and "biases" that have been observed with respect to our interaction partners, might be actually more than that. Due to its importance in almost all interaction, we need to take into account what agents "assume" to know about their interaction partner and what they "do" know (through previous interactions). Doing so might turn many seemingly irrational biases into behaviors adapted to make us interact with the right people at the right time (in the right way).

8.2   Future work

In the following I will present my recent research project. This project has received funding through an ANR JCJC in 2015. The project aims at studying under a common framework many of the elements that have over the past years been proposed to be added to the rational actor model, still predominantly used in economics. These include emotions, empathy, trust, reading subtle signals from others and coordinating on common goals based on signals related to identity or group membership. While these elements have received individually significant attention by economists, usually their analysis is not combined and applied to diverse populations. We suggest that the recently popularized concept of social intelligence (or interpersonal or collective intelligence) combines many of these insights in a common framework (e.g. Goleman, 2007) and might thus provide valuable insights to economists and other social scientists. To account for the different aspects of this sort of decision-making, the project will be interdisciplinary in nature. It will use methods from psychology to measure

social intelligence, social emotions, detection of emotions and theory of mind; these methods will be complemented with observational, survey, and experimental methods from economics, political science and anthropology.

A first necessary step in the course of this project will be a structuring of the different elements that constitute social intelligence and analysis of the relationship of these elements to the traditional framing of decision situations used in economics. The general idea of social intelligence will be sub-divided in three components, as reflected by the following questions:

(1) how do agents know about the *payoffs* of other agents? Specifically if other agents are not own payoff maximizing, an agent has to deduce or assume the utility another agent will actually derive from various outcomes. In addition to questions concerning the distribution of different types of people in the population, we read and interpret reactions, emotions and other subtle signals from others. The ability to read and interpret these signals is highly variable within and across populations and will thus constitute a first element.

(2) how do agents know about the *strategies* of other agents? Under the assumption of own payoff maximization, knowing the interaction partner's payoffs implies knowledge about the other agents preferred course of action. We will try to disentangle the difference between payoffs and resulting strategies, since we believe that the two are not necessarily leading to the same predictions. Take the example of an agent that observes another agent getting very angry after some norm violation. Thus the norm violation reduces the agents" payoff. However whether the response to this anger will be punishment might be influenced by the agents" personality and physical formidability. Part of the research question will thus focus on the interpretation of signals from others and the ability to judge another agent's strategies based on varying levels of information on the agent's phenotype.

(3) how do agents know that *others* know about their strategies and payoffs? Many decision situations carry elements of a coordination problem. Specifically other regarding preferences might transform what might seem like a social dilemma (e.g. a prisoners' dilemma) in payoff terms into a coordination problem in utility terms. Coordination problems pose, however, new challenges to result in efficiency maximizing outcomes. If it is not assured that common knowledge exists concerning every agent facing the same game in utility terms, coordination might fail. Social intelligence, team reasoning, altruism, prosociality, mentalizing, and beliefs of joint group-membership might jointly overcome these problems. Our last element will thus focus on how these strategies can influence economic interactions and outcomes.

We will study these different elements from different angles, as represented by three work packages. The work packages are structured to group together subprojects that approach these questions using similar methods and turn around similar fundamental research objectives. The first work package will revolve around questions concerning the development of different social skills. This question will be approached by studying young pre-school children to investigate the timing of the development of these abilities. Second, in a pre-industrial society (Tsimane forager-farmers of Amazonian Bolivia) we will study the ontogeny of social intelligence using observational, survey and experimental techniques, and then compare age-specific social abilities to those in industrialized societies. The second work package will revolve around a detailed experimental analysis of the three different sub-points raised above for a general subject pool. We will evaluate social intelligence with methods traditionally used in psychology (e.g. personally scales, questionnaires) and combine these with behavioral observations in experimental paradigms from economics and political science. Some of these environments will concern situations that require assumptions about others' payoffs (e.g. a voting situation where other voters' payoffs from outcomes are not

known); some require assumptions about others' actions (e.g. in a trust or ultimatum game where the interaction partners' choices need to be predicted; or in a voting situation where the politicians' actions need to be predicted); and finally some situations will concern situations where actions of a whole group need to be anticipated or influenced (e.g. situations of strategic group building). Finally, the third work package will approach theoretical questions concerning the situations studied in the other two work packages. The aim is at the same time a theoretical structuring of the decision situations to be studied, a theoretical interpretation of the empirical results we obtain over the course of the research, and an attempt to generate novel, testable hypotheses and predictions across diverse populations and contexts. The theoretical approach will be related to the literature on psychological game theory (i.e. the individual's beliefs about others' beliefs and emotions); theories concerning higher-order reasoning (i.e. the beliefs about other players' strategies and reasoning) and theories related to team reasoning (i.e. decision criteria that take the group as a whole as reference).

8.3   Social intelligence concept

Social intelligence (or interpersonal intelligence) is part of the intelligence concept that relates to how people interact with others (Thorndike, 1920). Generally it is assumed that individuals who have high interpersonal intelligence are characterized by a sensitivity to others' moods, emotions, feelings, personality and motivations. This type of intelligence should not be misunderstood to be equivalent with extraversion or liking other people in general. Rather, those with high social intelligence communicate better with others and are better in understanding the situation of others. In their role they might be either leaders or followers and either using their ability for a common goal or their own private good. The concept of social intelligence is very much linked to emotional intelligence, i.e. the ability to perceive and evaluate one's own and other

people's emotions and to discriminate between different emotions and label them appropriately. Emotional intelligence also includes the ability to use this information with respect to choices and behavior. Goleman (2007) has extended the emotional intelligence concept to social intelligence, by proposing two elements: social awareness and social facility. Social awareness implies understanding others' feelings and intentions, sensing non-verbal emotional signals and knowledge about how the social world works. Social facility is the ability to use insights from social awareness to allow for fitness-enhancing interactions. It includes effective presentation of oneself, shaping the outcome of social interactions and caring about others and acting accordingly (Goleman, 2007). Also related is the concept of collective intelligence (Woolley et al., 2010) that might explain a group's performance on a wide variety of tasks.

Traditionally social intelligence is measured by trying to evaluate 'social cognitive' abilities, often via questionnaires asking for self-evaluation given different scenarios or based on knowledge of psychological mechanisms. Tests that try to evaluate social awareness are in addition aimed at abilities linked to the "low road", e.g. emotion reading and empathy. Examples are tests that ask to evaluate emotional expressions from photographs or to judge the thoughts and feelings of an interaction partner (e.g. where the partners' actual thoughts and feelings are also recorded).

8.4 Approach and anticipated results

The project is by nature interdisciplinary: involved researchers come with training and expertise in experimental economics, game theory, logic, social psychology, developmental psychology, anthropology and political science. Most involved researchers are (or were) also affiliated with the Institute for Advanced Study in Toulouse (IAST).

The project includes a number of experimental projects. Results from this project will enhance our understanding of the interaction of the different elements constitut-

ing what is known as social intelligence and behavior in different types of decision situations. Results will thus be at the same time pertinent for researchers interested in the general context of social intelligence, but will also provide valuable insights to the respective disciplines, especially economics.

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van Dijk, F. and van Winden, F. (1997). Dynamics of social ties and local public good provision. *Journal of Public Economics*, 64:323–341.

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Vasalou, A., Hopfensitz, A., and Pitt, J. (2008). In praise of forgiveness: ways for repairing trust breakdowns in episodic online interactions. *International Journal of Human-Computer Studies*, 66(6):466–480.

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ASTRID HOPFENSITZ

Toulouse School of Economics
Office: 21 Allée de Brienne – 31000 Toulouse, France

Web: www.tse-fr.eu/people/astrid-hopfensitz
Email: astrid.hopfensitz@tse-fr.eu

PERSONAL INFORMATION:

Date of birth: 01 August 1975
Nationality: German
Languages: German, English, French, Dutch
Legal partnership with Stéphane Peysson, two children (born 2010 and 2015)

CURRENT POSITION:

Since 09/2007: **Maitre de Conference** (tenured lecturer) in Economics,
Toulouse School of Economics, Toulouse, France
Since 2012: Program Director in Psychology at IAST (Institute for Advanced Study in Toulouse)
Since 2017: President: Association Francaise d'Economie Experimentale (ASFEE)
Since 2017: Junior member: institut universitaire de France (IUF)

EDUCATION:

2002 - 2006: **University of Amsterdam,** Netherlands, **PhD in Economics**
Title of thesis: "The Role of Affect in Reciprocity and Risk Taking: Experimental Studies of Economic Behavior"
Advisor: Prof. Frans van Winden
Committee: Prof. Sam Bowles (Santa Fe, USA and Siena, Italy); Prof. Agneta Fischer (Amsterdam, Netherlands); Prof. Joep Sonnemans (Amsterdam, Netherlands); Prof. Chris Starmer (Nottingham, UK); Prof. Marcel Zeelenberg (Tilburg, Netherlands)

1994 – 1998 **University of Ulm,** Germany, **Diplom in Wirtschaftsmathematik**
2000 – 2001: Title of master thesis: "The evolution of altruistic behavior by group selection and its computational simulation"

1998 – 2000: **University of Massachusetts at Amherst,** USA, **Master of Arts in Economics**

DISTINCTIONS:

2017: Bronze Medal for economics from Centre National de la Recherche Scientifique (CNRS)

PROFESSIONAL EXPERIENCE:

09/2007 – present **Toulouse School of Economics**

Teaching: Behavioral Economics (1st year master) – (2007 – 2017)
Dynamic Models of the Economy (1st year master) – (2007 – 2008)
Microeconomics (1st year master) – (2011 – 2015)
Phd course: experimental and behavioral economics – (2011 – 2017)
Introduction to Macroeconomics (1st year bachelor) – (2007 – 2008)
Introduction to Microeconomics (1st year bachelor) – (2009 – 2013)
Microeconomics (2nd year bachelor) – (2016-2017)
Guest lecturer: Interdisciplinary master (University of Lausanne: 2007-2008)

General responsibilities: Elected member: conseil du laboratoire (GREMAQ) (2009-2010)
Elected member: conseil administrative Toulouse School of Economics (since 2010)
Local organizer: Toulouse network of information technology - TNIT (2009-2011)
Seminar organizer: Behavioral and Experimental Economics (since 2011)
Seminar coordinator: Institute for Advanced Study in Toulouse (IAST) (since 2012)

03/2006 – 08/2007: Post-doc: Swiss Center for Affective Sciences, National Center of Competence in Research (NCCR), University of Geneva

02/2002 – 02/2006: doctoral student, Center of Research in Experimental Economics and Political Decision making (CREED), University of Amsterdam

09/1999 – 06/2000: research assistant, University of Massachusetts, Amherst (USA)

PUBLICATIONS:

1. Articles:

[1] Cochard, F., Couprie, H. and Hopfensitz, A. (forthcoming). What if women earned more than their spouses? An experimental investigation of work division in couples. *Experimental Economics.*

[2] de Neys, W., Hopfensitz, A. and J.-F. Bonnefon (forthcoming). Split-second trustworthiness detection from faces in an economic game. *Experimental Psychology.*

[3] Bonnefon, J.-F., Hopfensitz, A. and W. de Neys (2017). Can we detect cooperators by looking at their face? *Current Directions in Psychological Science.* 26(3): 276-281.

[4] Hopfensitz, A. and J. Miquel-Florensa (2017). Mill Ownership and Farmer's Cooperative Behavior: The case of Costa Rica Coffee Farmers. *Journal of Institutional Economics.* 13(3): 623-648.

[5] Bonnefon, J.-F., Hopfensitz, A. and W. de Neys (2017). Trustworthiness perception at zero acquaintance: Consensus, accuracy and prejudice. *Behavioral and Brain Sciences.* 40.

[6] Loheac, Y., et. al. (2017). Mise en place d'une experience avec le grand public : entre recherche, vulgarisation et pedagogie. *Revue Economique*. 5: 211-223.

[7] Stieglitz, J., Gurven, M., Kaplan, H. and A. Hopfensitz (2017). Why household inefficiency? An experimental approach to assess spousal resource distribution preferences in a subsistence population undergoing socioeconomic change. *Evolution and Human Behavior*. 38(1): 71-81.

[8] Attanasi, G., Hopfensitz, A., Lorini, E. and F. Moisan (2016). Social connectedness improves co-ordination on individually costly, efficient outcomes. *European Economic Review*. 90: 86-109.

[9] Cochard, F., Couprie, H. and Hopfensitz, A. (2016). Do couples cooperate? An experimental investigation. *Review of Economics of the Household*. 14(1): 1-26.

[10] Bonnefon, J.-F., Hopfensitz, A. and W. de Neys (2015). Face-ism and kernels of truth in facial inferences. *Trends in Cognitive Sciences,* 19(8): 421-422.

[11] Centorrino, S., Djemai, E., Hopfensitz, A., Milinski, M. and P. Seabright (2015). A Model of Smiling as a Costly Signal of Cooperation Opportunities. *Adaptive Human Behavior and Physiology,* 1(3): 325-340.

[12] Beblo, M., D. Beninger, F. Cochard, H. Couprie and A. Hopfensitz (2015). Efficiency-Equality Trade-off within French and German Couples – A Comparative Experimental Study. *Annals of Economics and Statistics*. 117/118.

[13] De Neys, W., Hopfensitz, A. and J.-F. Bonnefon (2015). Adolescents gradually improve at detecting trustworthiness from the facial features of unknown adults. *Journal of Economic Psychology.* 47:17-22.

[14] Centorrino, S., Djemai, E., Hopfensitz, A., Milinski, M. and P. Seabright (2015). Honest signaling in trust interactions: smiles rated as genuine induce trust and signal higher earnings opportunities. *Evolution and Human Behavior.* 36: 8-16. Citation count: 2 (Web of Science)

[15] Hopfensitz, A., Lorini, E. and F. Moisan (2014). Games played in the 'north' and the 'south' of the map when goals are at conflict. commentary on "Mapping Collective Behavior in the Big-data Era". *Behavioral and Brain Sciences.* 37(1): 85-87.

[16] Attanasi, G., Hopfensitz, A., Lorini, E. and F. Moisan (2014). The Effects of Social Ties on Coordination: Conceptual Foundations for an Empirical Analysis. *Phenomenology and the Cognitive Sciences.* 13(1): 47-73.

[17] De Neys, W., Hopfensitz, A. and J.-F. Bonnefon (2013). Low second-to-fourth digit ratio predicts indiscriminant social suspicion, not improved trustworthiness detection. *Biology Letters*, vol. 9(2). Citation count: 2 (Web of Science)

[18] Bonnefon, J.-F., Hopfensitz, A. and W. de Neys (2013). The modular nature of trustworthiness detection. *Journal of Experimental Psychology: General*. Vol. 142(1), 143-150. Citation count: 13 (Web of Science)

[19] van Winden, F., Krawczyk, M., and Hopfensitz, A. (2011). Investment, Resolution of Risk, and the Role of Affect. *Journal of Economic Psychology,* 32(6)*,* 918-939. Citation count: 12 (Web of Science)

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[22] Vasalou, A., Hopfensitz, A., and Pitt, J. (2008). In praise of forgiveness: ways for repairing trust breakdowns in episodic online interactions. *International Journal of Human-Computer Studies,* 66(6): 466-480. Citation count: 17 (Web of Science)

[23] Hopfensitz, A. and van Winden, F. (2008). Dynamic Choice, Independence, and Emotions. *Theory and Decision,* 64: 249-300. Citation count: 5 (Web of Science)

[24] van Veelen, M. and Hopfensitz, A. (2007). In Love and War; altruism, norm formation, and two different types of group selection. *Journal of Theoretical Biology,* 249(4): 667-680. Citation count: 16 (Web of Science)

[25] Ben-Shakhar, G., Bornstein, G., Hopfensitz, A., and van Winden, F. (2007). Reciprocity and emotions in bargaining using physiological and self-report measures. *Journal of Economic Psychology,* 28(3): 314-323. Citation count: 34 (Web of Science)

[26] Bowles, S., Choi, J.-K., and Hopfensitz, A. (2003). The co-evolution of individual behaviors and social institutions. *Journal of Theoretical Biology*, 223:135-147. Citation count: 113 (Web of Science)

2. Contributions to books:

[27] Hopfensitz A. (2017). Seeing and knowing others: the impact of social ties on economic interactions. In *Behavioral Economics With Smart People*. editor Morris Altman, Cheltenham, England: Edward Elgar.

[28] Hopfensitz, A. (2015). Emotions and decision making. In *Real World Decision Making: An Encyclopedia of Behavioral Economics*. editor Morris Altman, Praeger ABC-CLIO.

[29] Hopfensitz, A. (2015). Social ties. In *Real World Decision Making: An Encyclopedia of Behavioral Economics*. editor Morris Altman, Praeger ABC-CLIO.

[30] Hopfensitz, A. (2006). *The Role of Affect in Reciprocity and Risk Taking: Experimental Studies of Economic behavior*, Thela thesis, Amsterdam

[31] Hopfensitz, A. (2005). Eifersucht: Eine Leidenschaft die Leiden schafft? *('Is jealousy only made to make us feel bad?')* In Blümle, G., editor, *Kulturelle Ökonomik*. LIT-Verlag.

[32] Henrich, J., Bowles, S., Boyd, R. T., Hopfensitz, A., Richerson, P. J., Sigmund, K., Smith, E. A., Weissing, F. J., and Young, H. P. (2003). Group report: The cultural and genetic evolution of human cooperation. In Hammerstein, P., editor, *Dahlem Workshop Report 'Genetic and Cultural Evolution of Cooperation'*. MIT press. Citation count: 13 (Web of Science)

3. Working papers:

[33] Hopfensitz, A. and Wranik, T. (2008). Psychological and Environmental Determinants of Myopic Loss Aversion. *NETSPAR discussion paper. Nr. 2008-013.*

[34] Hopfensitz, A. (2009). Previous outcomes and reference dependence: A meta study of repeated investment tasks with and without restricted feedback. *MPRA working paper.*

[35] Hopfensitz, A. and Wranik, T. (2009). How to adapt to changing markets: experience and personality in a repeated investment game. *MPRA working paper nr*. 17835

[36] Hopfensitz, A. and P. Miquel-Florensa (2014). Investigating social capital in Colombia: Conflict and public good contributions. *TSE Working Paper*, n. 14-463, January 31, 2014.

[37] Hopfensitz, A., Mantilla, C. and P. Miquel-Florensa (2016), Conditional rewards for sustainable behavior: targeting lessons from an open access fishery, *TSE Working Paper*, n. 16-633, March 2016.

[38] Hopfensitz, A., Reuben, E., and C. Rott (2017). Does public awareness of arbitrary gender stereotypes eliminate labor-market segregation? *manuscript in preparation*

4. Others:

[39] Hopfensitz, A., (2009). Des financiers trop hardis, *L' Expansion*, vol. 746, November 2009

[40] Qui cherche cherche: (mini documentary on trust detection in others). youtu.be/m-mke1Oguko

Citations:
Web of Science see ResearcherID: A-4248-2009 (as September 2017: sum of citations: 337; h-index: 8)
Publish or Perish: h-index: 11

WORKSHOPS AND SUMMER SCHOOLS

2011:   - *Montpellier workshop on field experiments*, 11/2011, Montpellier, France

2009:   - *SIEPR Conference on Internet Economics*, 09/2009, Stanford, USA
             - *BEE workshop*: Neuroeconomics and Psychology, 06/2009, Toulouse, France

2008:   - *Multidisciplinary workshop: social choice*, 11/2008, Toulouse, France

2007:   - *Dutch National Bank (DNB) research conference* "Behavioural Economics: Challenges for Policy Makers and Financial Institutions", 11/2007, Amsterdam, The Netherlands

2005:   - *Mannheim Empirical Research Summer School*, 07/2005; Mannheim, Germany

2004:   - *The Emotional Basis of Cooperation and Punishment*, 02/2004; Santa Fe Institute, New Mexico, USA

2003:   - *Summer school on Behavioral Economics*, 07/2003; Central European University, Budapest, Hungary

2002:   - *Experimental Economics Summer School*, 07/2002; Max Planck Institute, Jena, Germany
             - *Dahlem Workshop: Genetic and Cultural Evolution of Cooperation*, 06/2002; Berlin, Germany

2001:   - *Money, Happiness & Impatience*, 07/2001; European Science Days, Steyr, Austria

2000:   - *Workshop in Experimental Economics*, 08/2000; Tucson, Arizona, USA
             - *Complex Systems Summer School*, 06/2000; Santa Fe Institute, New Mexico, USA
             - *Workshop on Computational Economics*, 06/2000; Santa Fe Institute, New Mexico, USA

PARTICIPATION AT SCIENTIFIC CONFERENCES:

2017:   - EASP (European Association of Social Psychology), 7/2017, Granada, Spain
             - IMEBESS, 4/2017, Barcelona, Spain
             - ASFEE, 5/2017, Rennes, France

2016:   - Labour Markets: LEWorkshop, 11/2016, Middlesex University
             - NAG: Norms, Actions and Games, 06/2016, Toulouse, *local organizer*

2015:   - ASFEE, 06/2015, Paris, France
             - IMEBESS, 04/2015, Toulouse, *local organizer*

2014:   - ESA European meeting, 09/2014, Prague, Czech Republic
             - Maastricht workshop in behavioral and experimental economics, 06/2014, Maastricht, NL
             - Thurgau Experimental Economics Meeting, 05/2014, Stein am Rhein, CH
             - IMEBESS, 04/2014, Oxford, UK
             - Norms, Actions and Games, 04/2014, London, UK

2013:   - Gender stereotypes at work, 09/2013, Berlin, Germany
             - Florence Workshop on Behavioral and Experimental Economics, 05/2013, Florence, Italy
             - IMEBE meeting, 04/2013, Madrid, Spain

2012:   - ESA (*Economic Science Association*) world meeting, 07/2012, New York
             - IMEBE meeting, 03/2012, Castellon, Spain

2011:   - 14th International Conference on Social Dilemmas, 07/2011, Amsterdam
             - Human Behavior and Evolution, 06/2011, Montpellier, France

2009:   - *ASFEE* How cognitive neuroscience can inform economics? *invited speaker* 10/2009, Grenoble
             - ESA European meeting, 09/2009, Innsbruck, Austria
             - IMEBE, 04/2009, Granada, Spain

2008:   - ESA (*Economic Science Association*) European meeting, 09/2008, Lyon, France
             - *Emotions and Experimentation*, 02/2008, GREThA, Bordeaux, France
             - *Netspar pensions workshop*, 01/2008, Utrecht, The Netherlands

2007:   - ESPP (*European Society for Philosophy and Psychology*), 07/2007; Geneva, CH
             - ESA (*Economic Science Association*) World meeting, 06/2007; Rome, Italy
             - Cognition and Emotions in Economic Decision Making, 01/2007; Rovereto, Italy

2006:   - ESA (*Economic Science Association*) European Meeting, 09/2006; Nottingham, UK
             - IAREP-SABE (*Conference on Economics and Psychology*), 07/2006; Paris, France

2005:   - IMEBE (*International Meeting on Experimental and Behavioral Economics*), 12/2005;
Valencia, Spain
- *Symposium on Psychology and Economics,* 09/2005; Tilburg, Netherlands
- ISRE (*International Society for Research on Emotions*) Conference, 07/2005; Bari, Italy
- ESA (*Economic Science Association*) International Meeting, 06/2005; Montréal, Canada
- *NYU: PhD student conference*, 02/2005; New York, USA

2004:   - *Symposium on Psychology and Economics,* 09/2004; Tilburg, Netherlands
- ISRE (*International Society for Research on Emotions*) Conference, 07/2004; New York, USA
- ESA (*Economic Science Association*) International Meeting, 06/2004; Amsterdam, Netherlands
- CERE Conference (*Consortium of European Research on Emotion*), 05/2004; Amsterdam, NL

2003:   - ESA (*Economic Science Association*) European meeting, 09/2003; Erfurt, Germany

2002:   - *Psychobiology of Emotions*, Conference and Workshop, Banbury Center, 10/2002; New York, USA
- ENDEAR (*European Network for the Development of Experimental Economics*) Conference, 09/2002;
Jena, Germany

SEMINARS AND VISITS:

2017:   - NYU Abu Dhabi, 4/2017

2016:   - EUI, 2/2016, Florence, Italy

2014:   - *Paris School of Economics*, 12/2014, Paris, France
- *Tilburg* University, 1/2014; Tilburg, The Netherlands

2013:   - *Tinbergen Institute*, 10/2013 ; Amsterdam, The Netherlands
- *Santa Fe Institute*, 07/2013; Santa Fe, New Mexico
- *University of Rennes*, 03/2013; Rennes, France

2009:   - *Centre des jeunes dirigeants*, 10/2009; Toulouse, France

2008:   - *National University of Ireland*, 11/2008; Maynooth, Ireland

2007:   - *Toulouse School of Economics*, 12/2007; Toulouse, France
- *Tinbergen Institute*: *20 years alumni lustrum*, 05/2007; Amsterdam, The Netherlands
- *University of Montpellier,* 03/2007; Montpellier, France
- *CNRS*, University of Paris, 3/2007; Paris, France
- *University of Tilburg*, 1/2007; Tilburg, The Netherlands

2006:   - *Institute of Swiss Banking*, University of Zürich, 11/2006; Zürich, Switzerland
- GATE - CNRS, 06/2006; Lyon, France
- *Institute for Empirical Research in Economics*, University of Zürich, 04/2006; Zürich, Switzerland

2004:   - *Tinbergen Institute*, University of Amsterdam, 11/2004; Amsterdam, The Netherlands

REVIEWING:

Journals: *American Economic Review; American Economic Journal: Economic Policy; Cognition; Economics of Governance; European Economic Review; Experimental Economics; Evolution and Human Behavior; Games and Economic Behavior; German Economic Review; International Economic Review; Journal of Development Studies; Journal of Economic Behavior & Organization; Journal of Economic Theory; Journal of Risk and Insurance; Journal of Risk and Uncertainty; Journal of Pragmatics; Journal of Public Economics; Journal of Socio-Economics; Journal of Theoretical Biology; Management Science; OEconomia; Political Psychology; Review of Economic Studies; The B.E. Journal of Economic Analysis & Policy; Theory and Decision* - Books: *Cambridge University Press* - Project evaluation: *Agence nationale de la recherche (ANR), AXA research grants, Chercheurs d'avenir - Languedoc Roussillon, Research Council of Canada, Dutch Science Association (NWO), European Research Council (ERC)*

STUDENTS:

Andrei Ivanescu (since September 2014)
Fred Moisan (graduation September 2013 – now post-doc at Carnegie Mellon University)

FUNDING AND GRANTS:

2015:   - ANR research grant (JCJC): "Social Intelligence: experiments and theories concerning economic agents (SINT)" - (project leader) (139000 euros)

2014:   - PRES funding for Phd position: "PaFCoM: Parenté, Familiarité et Cognition morale", with Jean-Francois Bonnefon
- OrNE3 – funding for experiments from the MSH Toulouse (5000 euros)

2013:   - ANR research grant: "Kin, Kith and moral cognition", (K2MC) with Gwenael Kaminski (project leader) (143990 euros)
- One year research grant (delegation CNRS)

2012:   - ChildTrust - Funding for experiment from the MSH Toulouse (1000 euros)

2010:   - ANR research grant (JCJC): "social ties in economics: experiments and theory" – (project leader) (132000 euros)
- PRES and ANR research grant: Incentivizing environmentally responsible behaviour: An integration of economic and psychological approaches" (INCRESP) with Denis Hilton and Nicolas Treich (295734 euros)

2009:   - PRES Phd position grant: "Epistemic states, trust and responsibility of economic agents: from representation to experimentation" with Andreas Herzig and Laurent Perrussel (student employed: Fred Moissan)

2008:   - NETSPAR research grant: "Increasing confidence and combating overconfidence: personality and contextual variables influencing financial risk taking" – (project leader) with Tanja Wranik (10000 euros)
- PRES research grant: "Psychological and economic perspectives on cooperation and trust" – (project leader) with Denis Hilton, Roberta Dessi and Giuseppe Attanasi, Toulouse, France (28210 euros)

2006:   - NETSPAR research grant: "Psychological Foundations of Investor Preferences" – (project leader) with Tanja Wranik, Tilburg, Netherlands (5000 euros)

1998:   - tuition waver grant, *Baden Würtemberg Program*, University of Massachusetts, Amherst, USA

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