Chapter 10
The "Reign of Mystery": Have We Missed Something Crucial in Our Experimental and Computational Work on Social Norms?

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This book is needed for three reasons. Firstly, it helps us to realise the importance of understanding dynamic social norms by studying the interplay of micro and macro aspects. Secondly, it allows us to appreciate this difficult challenge and the need for advanced experimental and computational approaches. Thirdly, it is here at the right moment.

Let us first look at the present state of our society. Now, individualisation is on the ebb, people are fragmented into social groups that develop, overlap and disband even across virtual spaces and large-scale social and technological changes are dramatically modifying the material and cultural bases of our lives. New institutional and normative equilibria will probably soon take place at various levels, e.g. society, the economy and politics. In this situation, understanding how social norms emerge, under what conditions they persist or change and how we could promote or inhibit them is essential to ensure that groups and communities can regulate themselves for the collective good.

Previous studies have suggested that we follow social norms for a variety of reasons. We do so in view of certain material or reputational benefit, as others expect, as it is generally good, as we learnt to do so by relatives and peers, unconsciously and by habit or simply to save time for more rewarding, pressing or emotional activities. Game theory, sociology, social psychology, cognitive sciences and economics have explored all the various angles of social norms (e.g. Dubois, 2002; Gintis, Bowles, Boyd, & Fehr, 2005).

Certain authors have indicated that social norms could be more fruitfully understood by formalised models, which leads us to simplify, abstract and experiment (e.g. Corten & Buskens, 2010; Ostrom & Walker, 2003). Others have defended the idea that social norms and their dynamics could be better understood by description

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M. Xenitidou and B. Edmonds (eds.), *The Complexity of Social Norms*, Computational Social Sciences, DOI 10.1007/978-3-319-05308-0_10,

and history (e.g. North, 2005). I agree with this book that formalised and quantitative research, including computational and experimental research, is crucial to disentangle the social mechanisms of norms and to integrate theory and observation better. Although this does not disqualify the importance of qualitative and historical descriptions of norm emergence and change, I believe that significant explanatory advances can be made especially by evidence-based formalised theory (e.g. Squazzoni, 2008; Timmermans, de Haan, & Squazzoni, 2008).

Having said this, my contribution aims to discuss two main arguments. First, I would like to reconsider the social component of the book's equation: "cognition + social context = complexity of social norms." My idea is that this component has been an invisible guest in most book contributions. In the first part of this chapter, I focus on the role of social structures in influencing social norms and I provide experimental and simulation findings that indicate that norms are sensitive to "who interacts with whom." My understanding is that the idea of "social context" is too vague if not anchored to concrete social interaction structures.

Secondly, I would like to discuss the coherence of research strategies followed by this book's contributions and their expected results. I agree with Andrighetto et al. that experimental research can look only at the "observational" side of normative facts, not at their mental counterparts. This is evident also in the brilliant experimental chapters by Welsey Perkins on misperceptions, Cristina Bicchieri and Hugo Mercier on deliberation, Christine Horne on norm enforcement and Marco A. Janssen and Elinor Ostrom on commons. On the other hand, unlike Andrighetto et al., I have serious doubts about looking at unobservable, mental processes from a hard cognitive approach or that it is sufficient to understand social norms. Certain recent advances in neuro-economics and neurobiology have shown that individuals' normative behaviour is less cognitive and more emotional and social (see also Elster, 2007, 2009). I would also like to question whether agent-based modelling (ABM) is the most appropriate strategy to look at these mental facts.

Before continuing, I would also like to confess that I am a sociologist. As such, I am interested in explaining large-scale social outcomes from agent interaction in social structures. In my work, the behavioural and cognitive components of individual behaviour are instrumental to explain social outcomes and not an end in itself, nor a tribute to the truth (Coleman, 1990). This must be said as other colleagues might have different objectives and study social norms from other angles. However, my contribution to this book is to provoke a constructive debate and so I will be less panegyric than the book may otherwise really deserve.

The "Social Component" or the Invisible Guest

Most contributions here have emphasised the importance of embedding social norms into a social context. The editors have indicated that one of their main purposes is to reinvigorate the study of norms by looking at time and context. I suppose that all contributors would agree in saying that cognition and individual behaviour

is intrinsically social and that norms strongly depend on social interaction and are influenced by the social context. However, my impression is that this "social component" has been poorly elaborated. Therefore, I would like to suggest that materialising this "social component" into concrete and structured social interactions could improve our understanding of social norms.

Numerous sociological studies have shown that the mechanics of social interaction, for which social structure is largely responsible, dramatically influence the emergence of social norms. This is because rational motives and normative foundations of individual behaviour are not clearly separable and so are context dependent (e.g. Bowles, 2008; Gintis et al., 2005). Schelling (1978), Powell (1990), Coleman (2000) and Burt (2005) among others showed that social structures influence social norms because they embody certain mechanisms of social interdependence. Indeed, the mechanics of social contacts play a crucial role in determining and generalising social norms as individuals are extremely sensitive towards the behaviour and opinion of other individuals whom they are in contact with (e.g. Centola & Macy, 2007; Granovetter, 1978; Watts, 1999).

For instance, it is widely acknowledged that a dense, stable and relatively closed social structure, where individuals tend to interact frequently and repeatedly, tends to reduce free riding and favour norm convergence and persistence. This type of structure provides room for reputation-building strategies, magnifies behavioural signals, permits reciprocal behaviour's monitoring and makes relatively low-cost social sanctions possible (e.g. Buskens, 2002). This may happen in criminal gangs but also in neighbourhood associations, workplaces or among groups of friends. Obviously, the situation drastically changes if we look at more open and flexible social structures, such as markets. In this case, social norms are insufficient to ensure cooperation and powerful institutional arrangements such as contracts are needed to help us to reduce transaction costs and share the cost of social control (e.g. Cook, Hardin, & Levi, 2005).

Recent studies have found that even a network's configuration matters for norm emergence. For instance, Buskens, Corten, and Weesie (2008) built a simulation model that showed that network density influences the way behaviour develops: the higher the density, the stronger the influence of the initial behavioural distribution on a behaviour's emergent distribution. Moreover, they found that if social networks are initially segmented, as usually happens in reality for socio-historical reasons, the coexistence of different norms and even their polarisation is more probable.

By combining experiment and computational work on coordination games in dynamic networks, Corten and Buskens (2010) showed that any norm equilibrium is extremely sensitive to social influence. This is because individuals are strongly influenced by whoever they are in contact with and use the observed behaviour of neighbours to predict (often erroneously) the behaviour of unknown partners (e.g. Salganik & Watts, 2009). They also found that less efficient norms tend to persist when the social structure consists of dense networks as conformity prevails. On the other hand, more efficient norms can emerge if social structures endogenously develop with individual choices, i.e. if networks are flexible and breaking/creating links is economically and informationally possible.

We found a similar finding in an experimentally grounded model, where we replicated the experimental behaviour of subjects in an agent-based model so as to look at the macro implications of micro-scale behaviour. We wanted to understand the dynamic interplay of social interaction and social structure in trust situations (Bravo, Squazzoni, & Boero, 2012). First, 108 subjects played a repeated investment game, where subjects were randomly coupled to play as investors or trustees. Investors were asked to decide how much of their endowment to send to trustees, who in turn received the amount tripled by the experimenters and had to decide how much to return to the former. After the experiment, we estimated the behaviour of each subject in each round through a statistical model that looked both at the individual trust propensity of subjects and their capability of reacting upon experience.

Subsequently, we used these experimental data to calibrate an agent-based model that reproduced the experiment. First, we tested the impact of various network structures on cooperation. Then, we introduced the possibility that agents broke and created links according to a simple happiness threshold function. The investors/trustees were happy when trustees/investors returned/invested more or the same as in the previous interaction, and when happy they continued to interact with the same partners.

While static network configurations did not significantly alter the experimental results, dynamic networks based on partner selection significantly improved cooperation and fairness. This was due to the fact that, while norm abiders benefitted from more interactions and links and were more profitable by ensuring in turn higher profitability for their partners, the "bad apples" were isolated over time. In short, the social structure dynamically adapted to positive outcomes of social interaction, which in turn strengthened the functional configuration achieved over time by increasing the contact density between "good guys." This confirmed the fact that certain features of the social structure can play a soft social control function that helps individuals to defend positive norms and self-regulate their interaction for collective benefit.

The influence of social structures is also important in that it can magnify certain behavioural propensities that individuals show even in less complex network structures. In Boero, Bravo, Castellani, and Squazzoni (2009), we investigated the impact of reputation on trust and cooperation in structures based on random encounters. Starting from a typical investment game, such as above, we added the possibility that investors could rate trustees' behaviour at the benefit of subsequent investors, who knew the rating of the trustee with whom they were matched before the investment. Ratings were expressed in terms of "positive," "neutral" and "negative" trustee. Obviously, these investors' ratings were subjective, as investors' opinion on trustees depended on their own expectations and their level of investments. This meant that reputational information incorporated imprecise, even misleading information on trustees' real intentions and therefore had to be cautiously considered by investors. However, the simple fact that information on subject behaviour at time t_0 was available at time t_1 dramatically influenced both investors' and trustees' behaviour by ensuring more reciprocal trust. This was for various reasons.

In agreement with previous studies (e.g. Keser, 2003), we found that trustees returned significantly more when they were under rating as they were rationally motivated by reputation building. Although reputation was formulated under potential bias, negative emotions and subjectivity of investors, it was rational for trustees to achieve a good standing in view of future benefits from investors' decisions. On the other hand, we also tested a treatment where trustees' reputation was available to investors only after their decision, so that reputation building for trustees was ruled out. Even in this case, trustees behaved more fairly than when there was no reputation.

Moreover, we tested a treatment where even the investors were under reputation by trustees. In this case, trustees received the amount of resources sent by investors with whom they were matched as well as their past reputation. This information should not have any consequences on subjects' behaviour, as trustees should be influenced by the amount sent by investors and not by investors' previous reputation. Also in this case, there was no room for reputational building strategies by investors.

Our results showed that in all conditions, adding reputational information created more cooperation, irrespectively of its consequence for individual material pay-offs. Our conclusion was that subjects were influenced by being under judgment more than any induced, more rational, stimulus–response incentive. Once introduced and irrespective of its concrete economic value for the interaction, reputation implied that subjects framed the game as a moral problem and played more fairly (Kahneman & Tversky, 2000). It is worth noting that this occurred even if interaction was anonymous and communication was forbidden.

This was also confirmed by studies that looked at the role of gossip for cooperation (e.g. Dunbar, 1996, 2004). An experimental study showed that subjects were influenced by gossip even when they were also able to use other sources of information, including direct observation (Sommerfeld, Krambeck, Semmann, & Milinski, 2007). Piazza and Bering (2008) experimentally tested a modified version of the dictator game, where subjects were asked to distribute an endowment between themselves and an anonymous second party. Half of the participants were told that the second party would be discussing their decision with a third party. Their results showed that individuals dramatically overreacted to the possibility of being the subject of gossip by increasing their fairness even if the negative consequences of gossip were hardly predictable. Again, subjects were influenced by a mix of strategic reasoning and attention towards their own social approval.

The same interplay of rational motives and normative foundations was found in certain studies where subjects' mental processes were monitored through functional magnetic resonance imaging. For instance, Hsu, Anen, and Quartz (2008) showed that different brain regions activated whenever subjects faced a difficult trade-off between rational considerations based on efficiency motives and widespread social norms such as equity. More specifically, they found that a specific brain region (the *putamen*) responds to efficiency, while a second one (the *insula*) responds to equity. A third region (the *caudate/septal subgenual*) encodes a unified measure of these two motives and is probably linked with the resolution of the trade-off. Moreover, they found that a behavioural measure of individual differences in

inequity aversion correlates with the activity measured in the equity encoding regions. We can also imagine similar psychological mechanisms acting on reputation and leading to rational reputation-building actions that are, at least partially, separated from more social cognition-driven behaviours.

Recent experimental work has shown that subtle reputation-related cues significantly modified individuals' behaviour. As in our case, those cues were especially linked with the possibility of being observed. For instance, Haley and Fessler (2005) showed that the presence of stylized eyespots on computer desktops used for the experimental sessions significantly increased the generosity of players in a dictator game despite no differences in actual anonymity. In another work, conducted in a real-world setting, Bateson, Nettle, and Roberts (2006) found a similar effect of apparently unimportant cues of being watched. Their results showed that people put nearly three times as much money in an "honesty box," used to collect money for drinks in a university coffee room, when the cost of the drinks was displayed on a board along with a picture of eyes staring at the consumer than when the notice included a flower control picture.

It is curious to note that the effect of being watched is so striking that subjects even reacted when the "observer" was not human. The participants in another experiment contributed significantly more to a public good when a robot picture, which obviously represented a machine but endowed with two large eyes, was placed on their computer desktops (Burnham & Hare, 2007). This is to say that individuals in typical social situations would react more emotionally than cognitively and rationally.

In Bravo, Squazzoni, and Takács (2012), we extended these experimental designs to include intermediaries, who were asked to observe the exchange between investors and trustees and rate trustees' behaviour for investors. By doing so, we added a further layer of complexity as we transformed the typical dyadic trust relationship between investors and trustees in a triadic interaction.

As George Simmel argued in his famous piece on the significance of numbers for social life (Simmel, 1950), this extension has serious consequences. By adding a third element to a dyadic relationship, various processes can take place that were previously impossible, such as positive or negative intermediation, impartial opinions and more moderate passions (see also Coleman, 1990). For this reason, it is important to understand which incentives and social norms ensure cooperation between three actors in different roles. To do so, we tested various incentive schemes, by aligning intermediaries' pay-offs to investors or trustees and by excluding any material incentive. We also tested the same incentive schemes by keeping the role of structures fixed.

First, we found that the presence of intermediaries increased cooperation compared with dyadic reputation-based interaction as trustees were more trust responsive when rated by an intermediary. We also found that individuals were more sensitive to fairness and equity of the exchange when material incentives of intermediaries were ruled out. The triadic interaction structure, if combined with role alternation, provided room for indirect reciprocity motives that increased fairness and equity. This meant that, for intermediaries, being helpful to investors by

keeping the evaluation standard of trustees' fairness high at time t_0 was essential to expect reliable reputational information on trustees by investors playing as intermediaries at time t_1.

Furthermore, the lack of material incentives ensured intermediaries' neutrality as intermediaries' opinion was seen by the other figures as more credible as disinterested. It was essential however that the interaction structure included role rotation, as this ensured reciprocity strategies and allowed subjects to understand the implications of their decision in each role better.

To conclude this brief excursus, we can say that experimental and simulation research on social norms had two main findings. Firstly, understanding the strength of social norms without considering the social structure effect can bring partial conclusions, as the structure is a carrier of social influence and social influence is very important for norm emergence and persistence.

Secondly, most experimental work on social interaction confirmed that even in a cold social context such as the lab, individuals are influenced by moral sentiments and emotions, such as indignation, shame, envy and gratitude related to social approval (e.g. Elster, 2009; Gintis et al., 2005). This can explain the important role of reactive behaviour even in an interaction context, such as a strategic game, where experimenters intentionally induce the self-interest of subjects and the rational component of subjects' behaviour should dominate.

It is worth noting that neural investigation also confirms this point. Recent studies have shown that individuals' normative behaviour in social interaction can be understood more in terms of simple rewards and emotional schemes than as the result of complex psychological or cognitive factors (e.g. Glimcher, Colin, Russell, & Fehr, 2008). For instance, De Quervain et al. (2004) examined the neural basis for altruistic punishment of defectors in an investment game similar to our own one. The only modification was that investors had the chance of punishing unfair trustees by bearing a certain cost. They found that subjects derived personal satisfaction from punishing norm violators by activating the brain area related to rewards. They also found that individual differences in the motivation for this altruistic behaviour (e.g. normative vs. hedonistic motives), which are overemphasised in psychology, were irrelevant.

The social consequence of this behaviour was more important in that it created evolutionary advantages for good guys and preserved the well-being of the group by reducing opportunities for unfair behaviour. This means that moral emotions are crucial to understand the strength of social norms and that something "precognitive" could even take place as individual behaviour seems more influenced by biological and social factors (see also Rilling et al., 2002). This could also account for the importance of reactive behaviour that we all (wrongly) surprisingly see in the lab.

This discussion also has important implications for the next point of my chapter, as it brings us to consider the advantages of tighter integration between experimental and computational approaches and field and bio-neural work (e.g. Harmon-Jones & Winkielman, 2008; Ross, Sharp, Vuchinich, & Spurret, 2008). This means that we need to question whether ABM research and traditional experimental behavioural approach in the social sciences are sufficient in looking at the puzzle of social norms.

The Limits of ABM Research on Social Norms

Some chapters, such as Goldspink's, Elsenbroich's and Andrighetto et al.'s, have discussed the limitations of social simulation when looking at social norms, especially from a cognitive point of view. I would now like to outline that there has also been excessive emphasis on the capability of social simulation to look at all the subtle angles and implications of social norms. After reviewing about 15 years of ABM research in the social sciences (Squazzoni, 2010), I have realised that the most influential and widely acknowledged ABM applications have looked at the macro-level impact of agent interaction starting from simple micro mechanisms (Squazzoni, 2012). This could be for two reasons: it may reflect the fact that understanding the "bottom-up emergence" of social norms is one of the founding constituencies of all social sciences, or it may be given that ABM research is especially suitable to do so. I believe that both interpretations are true.

Social scientists have been fascinated by ABMs as they allow us to observe the large-scale, macro-level behaviour of systems based on agent interaction. It must be remembered that this has always been one of the most important challenges for any social science right from its conception (e.g. Coleman, 1990; Schelling, 1978). Before the advent of ABMs, we lacked methods and research technology to do so. This is the secret of the success of ABMs in the social sciences (Epstein, 2006; Epstein & Axtell, 1996; Hedström, 2005), not the fact that they could help us to understand the mental aspects of individual behaviour or to look at sophisticated cognitive processes behind individual behaviour.

ABM research cannot look at the whole picture of social norms including cognition, without losing its key feature, which is the study of macro-consequences of agent interaction. Indeed, we must consider that there is a trade-off between complexificating the cognitive components of models of social outcomes and understanding the impact of agent interaction on social outcomes. First, the extent to which the sophistication of cognitive component of a model should be pushed is a pragmatic choice and not an ontological starting point (Gilbert, 2005). This means that adding sophisticated cognitive properties to agent interaction models is useful only when it has been proven that more simplified and general assumptions are insufficient to explain the social outcome of interest. Secondly, we must consider that any sophistication comes at the cost of explanatory capacity, transparency and replicability of models, with dramatic consequences for cumulativeness and scientific advancement (Squazzoni, 2012).

Another criticism against over-sophisticated cognitive models is empirical validation. It must be recognised that it is difficult to produce testable findings on complex socio-cognitive aspects of social interaction at the level needed to look at social norms. So, one of the main challenges for all cognitive-sided contributions here is to understand how their findings could be empirically tested by observation and how to do so by remaining within the boundaries of experimental and computational research. I believe that neuroscientific research, and even more traditional qualitative research, could be especially suitable to look at inner cognitive mechanisms of individual behaviour and to validate cognitive explanations. I would like

to see computational and experimental research become more integrated with these approaches.

All in all, my impression is that computational and experimental approaches have severe limitations when looking at social norms. First, through experimental research and simulation, we can only observe the link between interaction and typically simplified agent behaviour and the possible consequences of this for large-scale agent interaction systems. This has also been outlined by Cristina Bicchieri and Hugo Mercier, and Marco A. Janssen and Elinor Ostrom, in this book: without field experiment and empirical research it is difficult to understand the micro mechanisms that cause individual behaviour. This implies that experimental research is mostly used to observe deviations from pre-constituted theories, such as rational choice predictions, rather than to find generative, causal explanations.

The reason for this is because it is impossible to look at emotions, unconscious reactions, effects of prior exposure and socialisation on individuals in the lab. This implies that in order to understand social norms, we often need to call for something outside the lab, not fully covered by the experimental design or indirectly understandable only "par différence." This gives us an idea of certain limitations of experimental research when dealing with mental and cognitive causes of individual behaviour, while again, this type of research is decisive for looking at social interaction on a small scale and in a simplified "stimulus–response" framework.

It is worth pointing out that these limitations do not disqualify experimental and computational approaches to social norms. I do not want to be misunderstood. In my view, these approaches are absolutely necessary. The problem is that they are not yet sufficient to understand the entirety of social norms. This requires cross-fertilisation of various methods, something that Poteete et al. recently called "working together" (2010). In this example, various methods, including field experiments, ethnographic research and surveys, were integrated with lab experiments and ABM to understand an important issue, i.e. collective action and commons. This cross-methodological work was inspired by a common framework and pursued a common explanatory goal. In this way, research could overcome the gap of observation scales that penalises its development and understand the link between local knowledge of social interaction and global implications better (Squazzoni, 2012). To conclude, this "working together" is a good example of the type of research that we should try to do more often in the field of social norms.

Conclusions, Obviously Partially Inconclusive

Here, I have tried to discuss how to embed the perspective of this book sociologically and I have pleaded for better integration between various types of research. I have suggested looking more carefully at the role of social structures in influencing social norms, so as to give a more concrete dimension to the idea of the "social context." I have also insisted on certain limits of strong cognitive approaches and suggested the importance of looking at more simple micro mechanisms of individual

behaviour. Examples include recent studies in neurobiology and neuroeconomics, whose findings could be positively integrated into experimental behavioural and ABM research. Finally, I have also outlined certain problems of current experimental work on social norms.

To conclude, the answer to most of these "critical arguments" will possibly come from research technology development. In the future, we may be capable of integrating empirical work, neural investigation, with experimental and ABM research, which are now pursued in parallel, by observing, for instance, human beings under magnetic resonance interacting in large-scale systems or by having access to a large amount of data on human behaviour at low cost and in real time. Maybe in the future, the quality of data available for social science research will significantly improve and the new social media will allow us to amplify our recourse to experimental research, so that theory and observation will become more integrated. As always happens in the history of science, innovation is strongly dependent on technology progress. Let us hope so.

But for the time being, we can say that the challenging issues presented in this book already demonstrate that disciplinary and research method barriers should be viewed as the result of institutional, organisational and historical processes of the science system rather than something that truly reflects important epistemological reasons. Certain examples in this book have allowed us to envisage future developments, but let us be more courageous and try to accelerate the pace of this "working together" attitude from today.

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