Valorisation

"Knowledge valorization refers to the process of creating value from knowledge, by making knowledge suitable and/or available for social (and/or economic) use and by making knowledge suitable for translation into competitive products, services, processes and new commercial activities."

— adapted definition based on the National Valorization Committee 2011:8

Valorisation as defined by the National Valorization Committee is the process by which knowledge created by research is made available to society and by which it is transformed into economic and social impact. Such impact can take many forms. Although most commonly thought of in terms of new products, services and processes, research impact can also take the form of scientific publications serving as basis for further research or a tool to spark public debate about certain phenomenon of societal or economic relevance. The form the impact of any research depends on the nature of such research, with a broad distinction made between fundamental and applied research.

Fundamental research seeks to develop and accumulate knowledge for the sake of the knowledge itself. Focus is thus often on exploring an abstract, general or philosophical question. Findings often also take the form of generalizations abstracting away from any specific real life practical applications that might have motivated the question to begin with. Applied research, on the other hand, focusses on answering a specific practical question, usually by developing new products and processes. Given the nature of applied research, it is mostly straightforward to think of its mediums of impact. Valorisation opportunities in fundamental research, on the other hand, are often achieved indirectly and over an extended period of time. It is fundamental research that uncovers links between phenomena previously thought of as unlinked and forms the basis upon which future applied research is based.

The field of epistemic game theory to which this thesis belongs is concerned with the reasoning process of individuals in situations of strategic interaction and the choice behavior resulting therefrom. This thesis investigates abstract epistemic models of reasoning of individuals attempting to make the "best possible" choices given the strategic uncertainties they face. This
thesis therefore belongs to the category of fundamental research. In what follows, potential future steps towards the realization of the economic and societal impact of the models at hand are discussed.

A characterizing aspect of epistemic game theory is the focus on players beliefs about their opponents' choices, about any unknown parameters in the game and about their opponents' beliefs. Hence, epistemic game theory makes explicit the fact that choice behavior of a player in a game does not only depend on that player’s preferences but also on his beliefs. This is inline with a growing stream in the experimental literature attempting to investigate the role players’ beliefs fulfill in a given strategic situation through belief elicitation. Belief elicitation experiments try to make both the choices and the beliefs of players in a given game observable. Epistemic models such as the ones developed in this thesis can thus serve as a source for experimentally testable hypotheses and as a tool to formalize observed results in experiments.

Models investigated in this thesis examine deviations of individuals’ choices from patterns prescribed by perfect rationality models, i.e. models where players are assumed to maximize subjective expected utility given their beliefs about their opponents’ choices and beliefs and about any other unknown parameters of the game. These deviations might find their origins in the cognitive limitations of individuals or in the interference of emotions such as regret, rejoice or spite. In any case, various forms of bounded rationality have been used to explain deviations of players’ choice behavior from choices prescribed by perfect rationality models both inside and outside the laboratory. Plentiful evidence supporting a significant role of fairness and reciprocity considerations has been found in laboratory experiments.

However, the role of bounded rationality models in explaining behavior has not been confined to experiments. One form of bounded rationality assumes players to be reference dependent rational, where players evaluate every choice relative to some reference point. The latter could be anything from the status quo level of wealth to a choice the player has made in similar or identical game or even a belief the player holds about his future choice and that of his opponent. Facing reference-dependent rational buyers, a seller on an online second-price sealed-bid auction is shown to be better off augmenting his auction with a Buy It Now option along with his reservation price, a phenomenon often witnessed nowadays in eBay auctions for example. Moreover, models of bounded rationality play an important role in the field of marketing where firms account for possible behavioral anomalies on the consumers part in setting their prices and designing their advertising strategies.

Like many reasoning concepts in the field of epistemic game theory, along with each of the models introduced in this thesis a characterizing computational procedure is defined. Thus in
addition to possible experimental applications of our models to uncover players’ beliefs, the mere characterization of choices players could reasonably make under a given epistemic concept may help gain more insights in the actual prominence of the different reasoning models players follow in reality. It is worth noting that testable hypotheses provided by epistemic game theory models in such case are different in nature from those obtained from classical game theory. The latter is focused on identifying the equilibrium outcome of a game which dictates a profile of strategies for players and implicitly assumes all players hold correct beliefs about their opponents’ profiles of choices and beliefs. Since it is highly unlikely that all players would hold such correct beliefs, such assumption can be fairly judged as unrealistic except may be for situations in which players interact repeatedly with the same opponents.

Epistemic concepts such as the ones developed in this thesis drop that correct belief assumption. If accompanied by an algorithm characterizing those choices that players can be expected to make under the respective reasoning concept (like the model of chapter 4), the characterized set of choices for any player in any given game is going to be a superset of the set of choices consistent with the corresponding equilibrium concept, if one exists. Those sets of choices can provide more reasonable testable hypotheses in games where players often deviate from the perfect rationality outcome in practice. One example for which this has been shown is experimental evidence on first-price sealed-bid auctions.

Theoretical predictions often put to the test in experiments of first-price auctions are based on the risk neutral Nash equilibrium where players are assumed to be perfectly rational and are assumed to have correct beliefs about their opponents’ choices and beliefs. Experimental data however indicates systematic deviations from theoretical equilibrium predictions in first-price sealed-bid auctions often in the form of overbidding. Relaxing the correct beliefs assumption it can be shown that a certain range of bids above the equilibrium choice can be reasonably expected to be made by a rational player believing in his opponents’ rationality, believing in his opponents’ belief in their opponents’ rationality and so on.

Hence, potential extensions and applications of the type of models introduced in this thesis mainly take the form of future research, often within the experimental lab. The findings of the latter could in turn be translated into research applied to real life strategic situations. Nevertheless, general intuitions and conclusions derived from theoretical models can in some cases be used to formulate testable hypotheses for real life games directly. Therefore, the most important medium of knowledge valorisation in the case of this thesis would be scientific publications. Publishing theoretical models such as ours in high impact journals widely read in the scientific and academic world would facilitate follow-up theoretical as well as empirical research.
It is worth noting that models in epistemic game theory often draw their motivation from empirically observed behavior inside and outside the experimental lab. Doing so, these models seek to generalize such observed behavior in theoretical models abstracting away from the specifics of the motivating cases to allow the intuition to extend to distinct yet similar situations. Hence, theoretical models themselves serve as an indirect valorisation channel of empirical research by generalizing the findings of the latter and paving the way for further steps of empirical exploration of human behavior in strategic situations. Although perfectly evident in the academic community, the fact that such theoretical models are so closely tied to their empirical counterparts is something that is often not that clear in the public eye.

Therefore, other forms of publications such as newspaper articles or blogs could play a vital role in bringing theoretical insights and its links to empirical findings into the public eye. More accessible publications could also spark public debate about potential applications of theoretical models. In addition to bringing theoretical models closer to the needs and questions of society, such debate could in turn feed the applied research community with an interesting source of further research questions. However most importantly, this might help raise awareness of the complexity of decision making in numerous strategic situations encountered in daily social and economic interactions between individuals.