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John Nash: A Personal Remembrance (Introduction to the John Forbes Nash Jr. Memorial Special Issue)

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John Nash: A Personal Remembrance

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I was privileged to meet John many years ago at one of the many game theory conferences held at the State University of New York, Stony Brook. On this occasion, I was in the hotel breakfast room. I had finished breakfast, and I recognized John Nash sitting at a table, also alone, in the corner. I was heading to the day's first conference presentation room where I would be making a presentation on our electric power experiments, conducted in collaboration with my colleagues Stephen Rassenti and Bart Wilson, who were not at the conference. (Rassenti *et al*., 2003a, 2003b)

I was not sure how to find the conference room where I would be presenting so I walked over to John Nash's table, introduced myself, and asked him if he knew where the room was. He replied that he was not sure himself, and suggested we look for it together. We found the room. After I gave my presentation, John asked the first question as a member of the audience; afterwards he came up to talk with me, fascinated by the whole exercise of designing a market for the exchange of wholesale power on a high voltage grid, and using laboratory subjects to test it in experiments. Moreover, as we report in Rassent *et al.* (2002), the exercise had been an essential element in informing the liberalization of the industry in New Zealand and Australia. John particularly wanted me to know that his father had been an electrical engineer and that he had always been interested in the subject.

I want to point out that without either of us thinking about it as such, John's proposal that we look for the room together, and my acceptance of it, demonstrated that we had chosen actions that constituted a Nash Equilibrium "solution" to our joint interactive task. At the time, we were neither friends nor both strangers—he was hardly a stranger to me for he was long known and acclaimed as one of the foremost contributors to mathematics and economics in the 20th century. I was surely a stranger to him as I was little known generally before the Nobel Foundation managed to find me in 2002.

Some might say that my happy encounter with John was too "collaborative" to be a good example of a non-cooperative equilibrium, frequently believed to apply only to inherently competitive adversaries. But why is anyone collaborative with another, if not because they have mutual interests that draw them together, with each worse off if acting alone?

Bidding at an auction for a work of art is only made possible by the many for whom the work has special value, inducing them to attend the auction. Their bidding behavior can be represented under particular conditions by a Nash Equilibrium bid function, b (v), where v is the value of the work to a bidder and b her corresponding equilibrium bid. The form of this Nash Equilibrium bid function varies with the rules of the auction. The particular conditions that allow these bid function strategies to be derived by Nash's methods, can be created in the laboratory, and a great many experimental studies of auction bidding behavior have been motivated by John's insightful contributions. (Cox *et al*., 1982) "Insightful" is the right word, because Nash's teacher, John von Neumann, saw the Nash theorem and its proof as trivial. I

suppose you could say that Einstein's contributions followed trivially once the equations of motion in physics took account of the finite velocity of light. What was truly astonishing for both Nash and Einstein was the insight they had in the context of the thought frameworks of their respective times.

Bidding to sell or to buy wholesale electrical energy on a complex high voltage grid can also be characterized in terms of Nash theory. Moreover, in repeat interaction subjects who have no knowledge of that theory do remarkably well in approximating Nash predicted behavior.

A relatively unknown fact about Nash was that he was much interested in whether and how people might actually come to play the equilibrium of a game as he represented it. In his PhD dissertation (Nash, 1950), there are two closing sections on "Motivation and Interpretation" and "Applications" that incisively discuss the theory's empirical relevance.

It is here that he observes that "the accepted ethics of fair play imply non-cooperative playing…" (p 26), that is, independence of action and a certain innocence of manipulative intent—an uncommon perspective in contemporary thinking. When he and I first met, neither of us had any expectation that we would become allies in looking for the seminar room!

In his thesis, Nash considers "the 'mass-action' interpretation of equilibrium…It is unnecessary to assume that the participants have full knowledge of the total structure of the game, or the ability and inclination to go through any complex reasoning processes. But the participants are supposed to accumulate empirical information on the relative advantages of the pure strategies at their disposal." (Nash, 1950, p 21)

In such situations, laboratory experiments draw their power from affording cash motivated human subjects with empirical experience in interactions within the structure of the game we put them in. They are assigned and incentivized by strictly private values for outcome allocations, receive feedback information on the outcomes of their joint actions, and through repeat play gain empirical experience on better and worse outcomes. In many examples, including some that are quite complex, they converge to approximately equilibrium outcomes, perhaps in the sense that Nash referred to as a "mass action" process. (Smith, 2008) Moreover, increased public information on individual values, is often inimical to better individual and/or group outcomes. (Fouraker and Siegel, 1963, pp 57-58; 142-151; 184-193; 199.) Hence, more information does not imply better outcomes.

Much is still to be learned about exactly how people get it right in the successful examples, or how and where they go wrong when they fail to converge to the equilibrium.

In our encounter John never mentioned his work and its obvious relevance to what we were learning from the electric power experiments. Rather he mentioned his father. My impression was that John was a wonderfully lovable man.

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