Obituary
Murat R. Sertel

Murat R. Sertel, the founder and editor-in-chief of *Review of Economic Design*, passed away on January 25, 2003, in Aix-en-Provence, France due to a heart attack. He was a genuine scholar, a brilliant intellectual, an excellent teacher, an energetic entrepreneur, a beloved friend, an enthusiastic leader, a generous host, a wonderful company, a devoted son and an affectionate father. This man from the Bosphorus whose contributions to put Turkey on the academic map of economic theory have been tremendous was a special person for everyone who knew him. His untimely death was met with deep sorrow by his colleagues, friends and students from all over the world.

Murat R. Sertel was born on July 12, 1942, in Ankara. He received his Bachelor's Degree at Robert College, İstanbul, in 1963, his B. Phil. Degree at Oxford University in 1966 and his Ph.D. at Massachusetts Institute of Technology in 1971. After having worked at MIT and the International Institute of Management, Berlin, he came back to Turkey in 1976 to join the Mathematics Department at Middle East Technical University, Ankara. He was a professor of economics at Boğaziçi University, İstanbul, from 1979 to 2002, during which period he also visited several universities and research institutes in different countries, including Austria, Belgium, France, India, Italy, the Netherlands, Spain, Turkey and the USA. He was a member of the Economics Department at Koç University when he died. Murat R. Sertel was a founding member of the Turkish Academy of Sciences, and his services to the science community have been immense both at the national and international levels. The most important projects he initiated and enthusiastically worked on, however, were all concerned with economic and social design. He was the editor-in-chief of this journal (formerly Economic Design), the editor of the book series Studies in Economic Design, the founder and director of the Center for Economic Design, a founding member of the Society for Economic Design and the Foundation for Economic Design, the initiator and designer of the Bosphorus Workshops on Economic Design as well as the Conferences on Economic Design.

Murat R. Sertel made significant contributions to economic theory and received numerous honors for his work. He published more than eighty papers along with eight books and volumes, which cover a broad spectrum of topics. His vision of economic design, however, can be traced from his earliest work to his latest studies as a unifying framework and can be best summarized by the following statement taken from the introduction of Advances in Economic Design [33]:

"Every existing institution is one from among many possibilities, and in many cases it is very doubtful that the existing world is the best among all possible worlds that we could have had."

What you will find below is a modest attempt to summarize Murat Sertel's work in economic theory with an awareness that any such attempt is destined to fail to cover many of his contributions.

Fixed point theory and non-cooperative equilibria of social systems

Murat R. Sertel's earliest work – jointly with P.Prakash - deals with different kinds of local convexity in topological semivector spaces, where each kind of convexity essentially leads to a different fixed point theorem [1]. The fixed point theorems of Kakutani, Tychonoff and Ky Fan follow as corollaries to these along with some new such theorems. These results, which are important in themselves and involve the construction of a machinery for "mass production" of fixed point theorems, were actually needed to prove the existence of non-cooperative equilibria in "social systems" [22]. A social system is a notion that was introduced by the Sertel and Prakash to deal with the problem of externalities that affect one's options in a very broad sense. The most crucial aspect of a social system in this regard was the concept of a "feasibility map" according to which the feasible actions for an agent changed as a function of his own action and others' actions along with his own present feasible set as well as others' present feasible sets. The level of generality of a social system and its non-cooperative equilibria is similar to that of Debreu's abstract economies and their so-called social equilibria. It should also be noted that neither does Debreu's result contain that of Prakash and Sertel, nor the other way around.

It is interesting to note that the final version of this paper published in 1996 in *Journal of Mathematical Economics* [22] is almost identical to its first version which was written in 1974 and only very slightly modified in 1976. The only difference of the published version from the 1976 version is that what was called the *feasibility dynamics* in the earlier versions was renamed as the *feasibility map* in the final version. This simply means that the paper had not been rendered obsolete by the progress witnessed within the two decades since its own inception. The authors delegated the discussion of the relevant literature that had come into being in the meantime along with the provision of economic examples demonstrating that the contributions of the paper had not been outdated to a companion paper, "Prakash and Sertel's theory of non-cooperative equilibria in social systems – twenty years later", by Başçı and Sertel [23].

Workers' enterprises and designing incentives

Murat Sertel made significant contributions to the area of workers' enterprises. According to his definition, a workers' enterprise is a firm whose workers coincide with its partners. As it is managed by or for its owners, as any firm is, it is "labor-managed". His workers' enterprises are, however, modeled differently than the so-called "labor-managed firms" often are in this literature. In the latter, it is rather

unclear to whom these firms belong and by what right the workers are to manage them. A more crucial difference stemming from the nature of property rights is concerned with the maximands ascribed to a workers' enterprise and to a labor-managed firm. A labor-managed firm is usually identified with the maximization of *per- worker* value added by labor. In Sertel's framework, it is, of course, again in the interest of each worker-partner to maximize the per-worker value added by labor, this time as a function of any variable *other than labor*, however. The labor input in a workers' enterprise can essentially be taken as the number of worker-partners. As partnership rights are regarded as a particular kind of ownership rights by Sertel, the possible adjustments of labor input are subject to these partnership rights. It is the introduction of a membership market based on these ownership rights which distinguishes a workers' enterprise from a labor-managed firm.

The perversities ascribed to labor-managed firms as pathological short-run supply and employment behavior or chronic underinvestment all disappear under the presence of this worker-partnership market. In fact, Murat Sertel shows the equivalence between a workers' enterprise and its entrepreneurial twin for perfect competition [11] as well as for (imperfect) quantity [14] or price competition [18]. An entrepreneurial twin of a workers' enterprise is a profit-maximizing firm that utilizes the same technology as the workers' enterprise, but hires all factors of production. The equilibrium in question – the competitive equilibrium, the Cournot equilibrium or the Bertrand equilibrium – stays unaltered if one replaces a workers' enterprise by its twin entrepreneurial firm, thanks to the taming effect of the worker-partnership market on the economic behavior of the workers' enterprises. The only difference between the two kinds of firms lies in how the firm's surplus is to be distributed.

The first explicit examples of different "rights structures" were given by Murat Sertel within the context of workers' enterprises. Regarding technology and preferences as the basic data given exogenously, he focused on "the man-made element of an incentive scheme" specifying how the agents are to be remunerated for their respective contributions. The novelty in his approach was that he was not regarding any particular rights structure as an element to which the designer has to bow as he has to bow to the laws of economics in designing an incentive scheme. According to him, designing a rights structure itself should be considered not only as belonging to the realm of design, but also constituting one of the most crucial elements in this realm. He drew attention to the limitations that an accepted rights structure would impose upon the acceptability of an incentive scheme, exemplifying this by considering four different rights structures for membership markets of workers' enterprises: free entry – free exit, free entry – approved exit, approved entry – free exit and approved entry – approved exit.

Theory of choice and path-independence

As it must have become clear by now, Murat Sertel knew how to pose the right questions, to determine the crucial angles from which further light should be shed on these questions and to develop novel notions to analyze them. Another characteristic feature of his intellectual style that has to be mentioned is that he would treat

certain problems exhaustively. One of the most typical examples of this is his work in the theory of choice. In [5], Sertel and Van Der Bellen consider over thirty conditions pertaining to choice functions and examine the implication relations between subsets of these properties. They determine the conjunction semilattices generated by certain sublists of these conditions, where the propositions are partially ordered by the implication relation. The authors give among other things several characterizations of Plott's path independence with which they also deal in [7]. They introduce the alternative notion of a *route* to model choices that are made by a step-by step or piecemeal procedure. Not only is a known characterization of Plott's path independence rediscovered thereby, but also other new insights yielded by this notion of route into the problem of step-by-step choosing are demonstrated and discussed.

Pretend-but perform mechanisms and games of pretension

Mevlana Celaleddin-i Rumi (1207–1273) says : "Either appear as you are, or be as you appear". Murat Sertel regarded the two parts of this statement as dual approaches, the first part corresponding to the notion of incentive compatibility which requires agents to reveal their true preferences, the second part leading to the so-called pretend-but-perform mechanisms introduced by himself, allowing agents to pretend to have any identity , provided that they perform in accordance with their claimed identities. This notion was first defined and introduced in [8] and applied in the context of a principal-agent problem in sharecropping by Alkan and Sertel. It is, of course, clear that such a mechanism will better the lot of the agent who always has the possibility to declare to have his true identity. The more interesting point, however, is that one may thereby achieve a Pareto improvement by also rendering the principal better off who does nothing but giving the agent the possibility of pretension.

The same notion was then utilized for regulating a Cournotic oligopoly . The general result obtained in these studies can be summarized as the creation of more competition among the firms in the oligopoly by simply requiring them to register their cost parameters at the Chamber of Commerce, provided that they exhibit the noncooperative behavior that a firm endowed with the pretended cost structure would show in the resulting fictitious oligopoly. The reason for this is that the institution of such a mechanism unleashes a further competition for the market share among the oligopolists that would otherwise be absent.

Games of pretension [9] deal with the institution of a pretend-but-perform approach within the framework of normal form games. One needs two solution concepts to formalize this approach: One to be employed in the game where the players choose their pretended identities, and another according to which the game with pretended identities is to be resolved. As for the original game one starts with, this leads to yet another composed solution concept that is different than both solution concepts employed at the "pretension" and "performance" stages. Murat Sertel regarded this approach important from the viewpoints of both economic design and positive economics. The role it is expected to play for design purposes is pretty clear as is also exemplified by the regulatory mechanisms for a Cournotic oligopoly

described above. The potential importance of this approach for positive theory is based on the question of whether what we regard as a naked observation may correspond to something that has already been distorted through pretentious behavior of the agents in question. Using the institution of games of pretension also yields a dozen-fold classification of two-person games [9] that seems to be telling about the intrinsic structural aspects of such games.

Manipulation by pre-donations

In environments where payoffs are transferable, players of a game, parties of a bargaining problem or agents involved in a matching problem may wish to unilaterally alter the given game or problem by predonating a portion of their payoffs to their opponents, knowing according to what solution concept the underlying situation is to be resolved. The pre-donators who will come out better off under the given solution concept by doing so may thereby even effect a Pareto efficient outcome improving the lot of their opponents as well. Thus, not only is it possible to resolve several well-known paradoxes via pre-donations in transferable payoff contexts, this approach also gives rise to a critique of certain solution concepts that are manipulable via pre-donations. In case a solution concept incites a mutually agreeable manipulation in a given situation via pre-donations, how can the analyst be sure that the agents will resolve the *original* situation according to that solution concept rather than the one *transformed* via pre-donations?

Murat Sertel introduced the idea of pre-donations in the late Eighties and dealt with its applications to different contexts as games with transferable payoffs, bargaining problems and matching problems with endowments. He showed that pre-donations resolved Prisoners' Dilemma under dominant strategy equilibrium, the Rationality Paradox associated with Rosenthal's centipede and Selten's Chain Store Paradox under subgame perfect equilibrium [16].

As for bargaining problems, he showed that the Nash bargaining solution manipulated by unilateral pre-donatios is Talmudic [17]. Here a pre-bargain stage is introduced where one of the agents may manipulate via pre-donations and thus lead to an alteration of the bargaining set. The Nash bargaining solution is then applied to the transformed bargaining problem. The final distribution of payoffs this two-stage procedure ends up with turns out to be in accordance with the Talmudic rule where the agents' ideal payoffs are interpreted as the claims of the two bargainers.

Manipulation, in general, was a focus of interest for Sertel as a designer. This interest of his is also exemplified by his work on manipulability via endowments in [20], [29] and [30].

Electoral system design: Majoritarian compromise

As a central institution in extracting a society's public will from its individual citizen preferences, the electoral system was regarded as one of the most important areas subject to design by Murat Sertel who argued that it should not be left to historical accident without comparing the incumbent system with conceivable alternatives. Taking the general dissatisfaction of the Turkish public with Turkey's electoral

system in the context of the local government elections of 1995 as his point of departure, he introduced the notion of *imposition-proofness* as a new axiom that an electoral system should be expected to satisfy. Roughly speaking, imposition-proofness means that the winner of an election should not be a candidate who is ranked by a majority of the citizens to be a relatively bad rather than a relatively good candidate among those available. Plurality, for example, is not imposition-proof in this sense, as it could elect a candidate whom it would simultaneously reject if it were employed in deciding who should NOT be elected according to the same preference profile.

Murat Sertel introduced an electoral system that he called *majoritarian compromise* as a solution to this problem [26]. If one measures the "happiness" brought to an agent by the election of a candidate through the number of candidates that that agent finds to be no better than the elected candidate, then a natural problem that arises is how one can deal with the optimization of this happiness content. The solution to this problem, in turn, depends upon what further restrictions are imposed by other desirable properties that one wishes to be satisfied by the voting rule designed. In case there are no such further restrictions, one ends up with the Borda rule. If the concern is to maximize the happiness level of the unhappiest agent in the society, then one ends up with the Kant-Rawls social compromise. The additional constraint that Murat Sertel took as a desirable property is majoritarianism. In many preference profiles, there is no candidate who receives the support of a majority if one takes into account only the top-most preferred candidates. In such cases the stick is lowered by one rank, and one counts how many agents rank a candidate as their first or second-best choice. In case there is a candidate who receives the support of a majority of the first or second degree without making any distinction between these degrees, such agents are regarded as the winners according to the majoritarian compromise, or some tie breaking rule is employed to single out some such candidates as the winner(s). One continues lowering the stick by one echelon each time until one reaches a rank k at which a candidate receives the support of a majority within the first k degrees. Such a support is easily seen to be reached within the first [(n+1)/2] ranks, so that the majoritarian compromise is imposition-free. Moreover, it is also pretty easy to see that it is "best" among all majoritarian rules regarding the social "happiness content".

As the majoritarian compromise is not monotonic, it is not Nash-implementable. Murat Sertel also worked on constructing simple mechanisms to implement it in subgame perfect Nash equilibrium [27]. He was very much interested in advocating this voting rule in Turkey and also did some experimental work to understand public preferences concerning certain voting rules including majoritarian compromise [32].

Designing rights

Murat Sertel's latest work was focused on introducing a general framework within which different rights structures in various environments could be dealt with. He defined and analyzed the notion of a *Rechtsstaat* for this purpose in [31]. This concept had its roots in his earliest work on workers' enterprises, where he had pro-

posed four different rights structures concerning partnership in workers' enterprises depending upon whether entry or exit was free or approved.. The characteristic feature of this approach is that it explicitly regards the rights structure as an element subject to design, while this is usually taken for granted in almost the entire literature in economic theory. If something is not doable, it may either be physically not achievable or not legitimate as it does not get the necessary approval needed according to the present rights structure.

A Rechtsstaat consists of three functions all of which are defined on the space of "alterations of states": an *ability*, a *benefit* and a *code*. An ability specifies all information about which coalitions are able of altering which states of the world into which. The physical or technological capabilities of coalitions are assumed as externally given and are thus to be regarded as constraints in all the design efforts. A benefit function describes the benefit accruing to each coalition at any alteration of state. Thus, one can deduce from a given benefit function which alterations of states will be approved or disapproved by which coalitions. A code of rights, on the other hand, specifies, for any alteration of state, which coalitions' approvals are to be sought for that alteration to be enacted.

Having introduced the notion of a Rechtsstaat, Murat Sertel dealt with both "Invisible Hand Theorems" and "Decentralization Theorems" within this framework. The first kind of theorems concerns the question of finding conditions under which a Rechtsstaat leads to socially optimal outcomes, while the central problem of the second kind is designing a code of rights that will induce prescribed states of the world that are optimal for the society in question.

This framework enables us to define and compare all possible worlds with the existing one as well as among themselves. This opens up a new avenue of research in economic and social design in quest of a better world. Those who do not wish to leave "the formation of institutions to historical accident without comparing the incumbent systems with conceivable alternatives" have a lot to learn from him.

Murat R.Sertel was one of the forerunners of the Age of Economic Design. He is being sorely missed by all of us.

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References

1. Prakash, P., Sertel, M.R. (1974) Topological semivector spaces: Convexity and fixed point theory. *Semigroup Forum* 9: 117–138
2. Sertel, M.R. (1975) The fundamental continuity theory of optimization on a compact space. *Journal of Optimization Theory and Applications* 16: 549–558
3. Prakash, P., Sertel, M.R. (1976) Hyperspaces of topological vector spaces: Their embedding in topological vector spaces. *Proceedings of the American Mathematical Society* 61: 163–168
4. Dirickx, Y.M.I., Sertel, M.R. (1979) Class conflict and fairness in "democratic capitalism". *Public Choice* 34: 99–116
5. Sertel, M.R., Van der Bellen, A. (1979) Synopses in the theory of choice. *Econometrica* 47: 1367–1389

6. Kleindorfer, P., Sertel, M.R. (1979) Profit-maximizing design of enterprises through incentives. *Journal of Economic Theory* 20: 318–339

7. Sertel, M.R., Van der Bellen, A. (1980) On the routewise application of choice. *Journal of Economic Theory* 22: 423–438

8. Sertel, M.R. (1982) *Workers and Incentives*. North-Holland, Amsterdam

9. Koray, S., Sertel, M.R. (1983) Games of Pretension. Research Paper ISS/EC 3, Boğaziçi University, Istanbul

10. Sertel, M.R., Steinherr, A. (1984) Information, incentives and the design of efficient institutions. *Zeitschrift für die Gesamte Staatswissenschaft* 140: 233–246

11. Sertel, M.R. (1988) Workers' enterprises are not perverse. *European Economic Review* 31: 1619–1625

12. Sertel, M.R. (1988) Regulation by participation. *Journal of Economics* (*Zeitschrift für Nationalökonomie)* 48: 111–134

13. Sertel, M.R. (1988) Characterizing approval voting. *Journal of Economic Theory* 45: 19–29

14. Sertel, M.R. (1991) Workers' enterprises in imperfect competition. *Journal of Comparative Economics* 15: 698–716

15. Koray, S., Sertel, M.R. (1992) The welfaristic characterization of revelation equilibria under imputational government. *Social Choice and Welfare* 9: 49–56

16. Chen, F., Sertel, M.R. (1992) Resolving paradoxical centipedes behavioristically or by unilateral pre-onations. In: B. Dutta et al. (eds) *Game Theory and Economic Applications*. Springer, Berlin Heidelberg New York

17. Sertel, M.R. (1992) The Nash bargaining solution manipulated by pre-donations is Talmudic. *Economics Letters* 40: 45–55

18. Sertel, M.R. (1993) Workers' enterprises in price competition. *Managerial and Decision Economics* 14: 445–449

19. Kleindorfer, P., Sertel, M.R. (1994) Auctioning the provision of an indivisible public good. *Journal of Economic Theory* 64: 20–34

20. Sertel, M.R. (1994) Manipulating Lindahl equilibria via endowments. *Economics Letters* 46: 167–171

21. Orbay, B.Z., Sertel, M.R. (1995) The trade paradox persists under excise taxes. *European Journal of Political Economy* 11: 743–759

22. Prakash, P., Sertel, M.R. (1996) Existence of non-cooperative equilibria in social systems. *Journal of Mathematical Economics* 25: 19–32

23. Başçı, E., Sertel, M.R. (1996) Prakash and Sertel's theory of non-cooperative equilibria in social systems – twenty years later. *Journal of Mathematical Economics* 25: 1–18

24. Sertel, M.R. (ed.) (1996) *Workers' Enterprises: Alternative in Privatization*. North-Holland, Elsevier, Amsterdam

25. Sertel, M.R., Yıldız, M. (1998) The Lindahl solution with changing population and resources. *Mathematical Social Sciences* 35: 151–163

26. Sertel, M.R. (ed.) (1999) *Contemporary Economic Issues Volume 4: Economic Behaviour and Design*. Macmillan, London

27. Sertel, M.R., Yılmaz, B. (1999) The majoritarian compromise is majoritarian optimal and subgame perfect implementable. *Social Choice and Welfare* 16: 615–627

28. Sertel, M.R., Yıldız, M. (1999) Double-edged population monotonicity of Walrasian equilibrium – A note on the nature of competition. *Mathematical Social Sciences* 37: 235–251

29. Sanver, M.R., Sertel, M.R. (1999) Equilibrium outcomes of Lindahl endowment pretension games. *European Journal of Political Economy* 15: 149–162

30. Özkal-Sanver, I., Sertel, M.R. (2002) Manipulability of men-(women-)optimal matching rule via endowments. *Mathematical Social Sciences* 44: 65–83

31. Sertel, M.R. (2002) Designing rights: Invisible hand theorems, covering and membership. Mimeo, Boğaziçi University, Istanbul

32. Sertel, M.R., Kara, A.E.G. (2003) Selecting a social choice rule – An exploratory panel study. In: Sertel, M.R., Koray, S. (eds.) *Advances in Economic Design*. Springer, Berlin, Heidelberg, New York

33. Sertel, M.R., Koray, S. (eds.) (2003) *Advances in Economic Design*. Springer, Berlin Heidelberg New York