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**SOCIOLOGICAL GAME THEORY: AGENCY, SOCIAL
STRUCTURES AND INTERACTION PROCESSES**

Summary

Game theory can be viewed as an important contribution to multi-agent modeling, with widespread applications in economics and other social sciences. This paper presents two distinct approaches to extending – sociologizing – classical game theory: firstly, a system/institutional approach – social science game theory (SGT), and secondly, Erving Goffman’s interactionist approach (I-game theory). The two approaches are presented and compared; they are also contrasted with the classical theory. The article ends by concluding that due to the social science game theory, sociologists and social scientists are no longer forced into the classical straightjacket with its hyper-rationality, anomic players, and the absence of any social fabric (institutional and cultural formations). Moreover, the new game theory offers a reliable toolbox of social science concepts and methods for describing, analyzing, and explaining highly diverse interaction phenomena. We claim that those two approaches have already proved themselves useful for investigating and modeling a variety of interaction processes including cooperation, conflict, and negotiation.

Key words: Game Theory, social theory, norms, institution roles, interaction, communication, negotiation

JEL Classification: A14, D70

1. Introduction

Classical game theory is widespread in social sciences (and also in engineering and management). It is also highly institutionalized – with very substantial funding supporting courses/programs, textbooks, journals, research programs, policy applications, etc. However, it is not a social science theory, even though it makes use of great knowledge of psychology, social psychology, political science, sociology, anthropology, etc.

Sociological or social science game theory approaches outlined in this article provide a theoretical, empirical, and policy alternative to the classical framework. Interaction game theory (IGT) and Sociological game theory (SGT) elaborate the concept of human agency, as well as relational and role concepts, and resource and technology concepts as part of interaction analyses. Sociological game theory provides rule-based mathematics (shared with computer science), which is very different than the mathematics of classical game theory (which concerns optimization). Rule-based mathematics provides formal definitions of cultural and institutional contexts, games, roles and role relationships, interaction norms and algorithms. However, classical game theory provides a number of tools that are useful in our own conceptualizations and model-construction, e.g. the 2-person and n-person game matrix; the interaction trees, the multi-level and nested games, the extreme cases of anomic agents trying to maximize uni-dimensional utility functions, etc.

The sociological approaches to reconceptualizing and elaborating game theory to be more useful in economics and other social sciences are presented below. A social systems/institutional approach, SGT is presented in section 2, followed by a presentation of Goffman's IGT (section 3). Section 4 discusses several key features of the theories and the differences between them and the classical game theory. It is argued that the two approaches are largely convergent and that they provide sociology and social sciences (including economy and management) with a wide range of concepts and methods with which to describe, analyze, and explain interaction phenomena.

2. Social Science Game Theory

Social science game theory entails the extension and generalization of classical game theory through the formulation of the mathematical theory of rules and rule systems and straight implementation in contemporary social sciences. The classical theory [Luce, Raiffa, 1957; Schelling, 1960; von Neumann, Morgenstern, 1944] is a special case of the more general SGT [Baumgartner et al., 1977, 2014; Buckley, Burns, 1974; Burns, Meeker, 1974; Burns, Roszkowska, 2006, 2007, 2008]. Sociological concepts such as norm, value, belief, role, social relationship, and institution as well as classical game theory concepts can be defined in a uniform way in terms of rules, rule complexes, and rule systems, which are also defined as mathematical objects. These tools enable to model social interaction taking into account economic, social, psychological, and cultural aspects as well as considering games with incomplete, imprecise or even false information.

The key points of SGT are the following [Burns, Roszkowska, 2005, 2007, 2008; Burns, Gomolińska, 2000]:

1. the theory is developed in and applied to multi-agent interaction situations where there are interdependencies among two or more of the agents (as in classical game theory).
2. SGT provides a cultural/institutional basis for the conceptualization and analysis of games in their socio-economical context, showing precisely the ways in which social norms and rules, values, institutions, and social relationships take part in shaping and regulating game processes. Games are re-conceptualized as social forms, showing precisely the ways in which the rule complexes of social relationships take part in shaping and regulating interaction processes.
3. SGT formulates the concept of judgment on the basis of which actors either construct their actions or make choices among given alternative actions through making comparisons and judging similarity (or dissimilarity) between the option or options considered in the game and their norms and values in the situation.
4. SGT distinguishes between open and closed games. The structure or rule regime of a closed game is fixed; in open games, actors have the capacity to structure, restructure, and transform game components such as the role components or the general “rules of the game”. Even external agents (“third parties”) may have the power (“meta-power”) to structure and transform games (for instance, “the prisoners' dilemma game as a three-person game” with the district attorney (DA) structuring the 2-person PD game).
5. SGT re-conceptualizes the notion of “game solution”. Some “solutions” envisioned or proposed by actors with different frameworks and interests are likely to be contradictory or incompatible. Under some conditions, however, actors may arrive at “common solutions” or have these imposed by external agents, which in both cases may be the basis of patterning of interaction and game equilibria.
6. SGT distinguishes different types of game equilibria, such as instrumental, normative, and social, etc.; one of these is a sociologically important type of equilibrium, namely normative equilibrium, which is the basis of social order.
7. While the theory readily and systematically incorporates the principle that human actors have mastered factual knowledge and computational capability, it emphasizes at the same time their extraordinary social knowledge, their capabilities and competences: in particular, their knowledge of diverse cultural forms and institutions such as family, market, government, business or work organization, hospitals, and educational systems, etc., which they use in framing and engaging in their social relationships and game interactions. The Table 1 presents the comparison of Sociological Game Theories and Classical Game Theory [Burns, 2008; Burns, Roszkowska, 2005, 2007; Luce, Raiffa, 1957; von Neumann, Morgenstern, 1944].

TABLE 1.

Comparison of Sociological Game Theories and Classical Game Theory

Sociological Theories of Games	Classical Game Theory
<p>Game rules as social rules (distinguished from material and technical constraints). In SGT, there is an explicit game rule complex, $G(t)$ – together with the physical and ecological constraints – to structure and regulate action and interaction; there is an elaborate theory of rules and rule regimes. IGT refers to and utilizes the rich variety of rules found in sociology and social science but does not systemize the concept.</p>	<p>Game constraints (“rules”) which include physical constraints (material constraints such as those of the physical environment but also built environments). Although games are defined as systems of rules, there is no conceptual or mathematical theory of rules and rule systems.</p>
<p>Players: Diverse types of actors in varying roles (in some cases shifting and even secret roles). Actors as creative, interpreting, and transformative beings (but with limited (“bounded”) rationality). Also, potentially they are moral beings, in part because they are subject to normative and institutional contexts.</p>	<p>Players: universal, super-rational agents lacking morality as well as creativity and transformative capabilities. The players are anomic beings, strangers – not subject to normative and institutional contexts and influences.</p>
<p>Games are socially embedded – normative, relational, and institutional contexts are identified and taken into account. Actors’ social relationships play an important part in how they play in relation to one another.</p>	<p>Games are context free, like the anomic and amoral players. Players do not have meaningful social relations.</p>
<p>Games may be symmetrical or asymmetrical – actors have different roles, positions of status and power, endowments; also, diversity in role components: value, model, act, judgment/modality, etc. They operate in different social and psychological contexts.</p>	<p>Symmetry is the norm</p>
<p>Possible game structuring and transformation. Actors involved in the game and/or external actors with sufficient powers can restructure and even transform a game, for instance, changing a zero-sum game into a coordination game, or a coordination game into a competitive or zero-sum game.</p>	<p>Game structures are fixed or given. Transformation was not conceived in the Classical theory.</p>
<p>Open and closed games (the openness of games stems from the previous factor). In open games, the action possibilities and outcomes are not all specified – and participants and/or external agents may open up or close down a game or game complex.</p>	<p>Closed games consistent with game structures being fixed or given.</p>
<p>VALUE($i, G(t)$) complex: In SGT, the player’s value and evaluative structures relate to the social context of the game (institutional setup, social relationships, and particular roles). Some values belong to the sacred core, being based on identity, status, role(s), and institutions to which agents may be strongly committed. “Not everything is negotiable”. IGT and SGT emphasize multiple values, which result in mixed motive games and</p>	<p>Utility function or preference ordering is given and exogenous to the game. There is linear ordering.</p>

dilemmas for participants, for instance between instrumental gain and norm realization, or between different norms, or divergent instrumentalities.	
MODEL(i,G(t)) complex. A player's model of the game situation may be based on highly incomplete, vague, or even false information. Imprecise (or vague/rough) data as well as imprecise rules and norms, strategies, and judgment processes occur. Reasoning processes may or may not follow standard logic. Actors' knowledge of their interaction situation is limited and variable.	Perfect or minimally imperfect information about the game, its players, their options, payoffs, and preference structures or utilities. Crisp information, strategies, decisions.
ACT(i,G) complex. It represents the range of events, strategies, routines, programs, and actions available to the player in their particular role and role relationships in the game situation. Ritual and ceremonial type of actions have been particularly emphasized in IGT.	Set of possible strategies (highly limited). Many types of actions such as ritual and ceremonial actions do not make sense in a purely rational, instrumental perspective. Innovative and creative activities are not part of the normal game range.
Communication actions. Communication conditions and forms are specified by the rules defining action opportunities in a given game. The diverse forms of communication and their uses or functions affect game processes and outcomes: for instance, by providing information or influencing others' beliefs and judgments. Communication may even entail deception and fabrication. Moreover, actors may or may not use available opportunities in the interaction situation to communicate with one another or to follow the same rules (the degree of asymmetry).	In classical game theory, a particularly important class of actions (and constraints on action) concerns communication. Communication rules are axioms at the start of the game and apply to all players. Non-cooperative games do not allow for communication, while "cooperative games" allow for communication (and making binding agreements).
JUDGMENT/MODALITY: J(i,G(t))-complex. Multiple modalities for action determination including instrumental, normative, habitual, game, and emotional modes of action determination, etc., which depend on context and definitions of appropriateness. The universal motivational factor is the human drive to realize or achieve particular value(s) or norm(s).	Singular modality: Instrumental rationality or " rational choice ". Maximization of expected utility as a universal choice principle.
Limited capabilities of cognition, judgment, and choice. Contradiction, incoherence and dilemmas arise because of multiple values and norms as well as other rules which do not always fit together in a given situation. Consistency and coherence are socially constructed and susceptible.	Super-capabilities of deliberation and choice according to fixed axioms of rationality. Consistency and coherence are assumed. Hamlet syndrome is not possible.
Solution concept: In SGT "solutions" are defined from a particular standpoint or model of each player. Disagreements among actors about appropriate or satisfactory solutions are expected. A common or general game solution satisfies or realizes the values or goals of the multiple players in the game. This is the aim and result of negotiation in many instances. IGT does not concern itself with the solution concept.	An "equilibrium" is the solution to the game.

Source: Authors' own elaboration [see also: Burns, Roszkowska, 2005].

3. Interaction Game Theory

Goffman's interactionist approach to extending classical game theory derives, in part, from the symbolic interaction perspective [Goffman, 1959, 1961, 1969; Manning, 1992]. Goffman's starting point for adapting game theory for his purposes draws very much on symbolic interaction theory [Blumer, 1973]. He refers explicitly to the “Meadian perspective” [Goffman, 1959; Manning, 1992, 136ff]. Consequently, he highlights issues of communication, symbols, rules, rituals, among other concepts.

1. Goffman considers game theory as a theory of social interaction where “interaction” is a process encompassing a sequence of assessment, decision-making, initiating a course of action, leading to payoffs. Its defining characteristic is the emphasis on strategic interaction.
2. Goffman focuses, as does SGT, on multi-agent interaction situations where there are interdependencies among two or more of the agents.
3. He makes use of sociological concepts such as rules, norms, roles, and social relationships in his analysis.
4. He stresses, as one would expect of a symbolic interactionist, communication among actors, their presentations, management of impressions in relation to one another, concealment, fabrication, and seduction.
5. He also emphasizes the regulation and strategies of self-expression (as would be expected from the author of “presentation of self in everyday life” [Goffman, 1959]).
6. IGT recognizes the role of third parties in structuring games and enforcing particular patterns.

Of particular importance in Goffman's sociological extension of classical game theory is his attention to, and elaboration of, socio-psychological aspects of game “players”: their technical knowledge and competence, their gamesmanship, their capabilities of assessing situations, other agents, and themselves. Drawing on psychology and social psychology, Goffman distinguishes such aspects or characteristics of players as game worthiness (ability to set aside personal feelings and emotions – “impulsive inclinations” – in implementing the situation and in following a course of action); the ability of a player to assess their own situation as well as assess the other player(s)' situation; the ability to assess the expressions and communications of others, their trustworthiness. These abilities, Goffman suggests, are important to game performance and success – there is nothing comparable in the classical game theory, either in quantity or quality.

4. Discussion

In the following discussion, we single out a few key factors in sociological game theorizing. They point to the broad extension of game theory that IGT and SGT accomplish – and why they constitute, arguably, a substantial alternative to classical game theory [Burns, 1990; Burns, Meeker, 1974; Burns, Roszkowska, 2005; Burns et al., 2014; Goffman, 1969; Manning, 1992].

1. IGT and SGT both point to such matters as **communication, negotiation, and cooperation based on solidarity as well as conflict and much else** as of being of sociological significance that have been neglected or superficially treated by classical game theory (although some of these issues have been addressed in later works (such as that of Thomas Schelling [1960]) but they did not fit naturally into the language and conceptualizations of the classical theory.
2. Both SGT and IGT **reject assumptions of super-rationality and one-dimensional utility** and recognize the extraordinary knowledgeable ability of human agents about institutions and norms and other rules as well as their mixed-motive and multi-value orientations.
3. **Actors' knowledge conditions.** In the sociological perspective, actors are seen to have limited and varying knowledge about their interaction situations but very considerable knowledge about the normative and institutional context; this is in contrast to classical game theory's assumption of complete information about the immediate game situation and its neglect of actors' normative and institutional knowledge – which is, in most instances, completely wrong, as the substantial contribution of social science research has demonstrated.
4. **Actors' values/goals/motives.** IGT as well as SGT accept that in some contexts the actors are instrumental in their orientations – “rational self-oriented agents”. But this does not apply, as in classical game theory, universally. In many, if not most, social contexts, actors operate on multiple value orientations, such as “value” of self and of another, or instrumental/rational value as well as one or more normative oriented values such as sharing or cooperating with others. Humans are social animals and display “caring-for-others” behavior, concern with others, putting “others before themselves” [Goffman, 1969, p. 92], serving a community, or an abstract ideal, or “the Law”, or “God”. Some or many of their values concern then taking other matters (than themselves) into account and sacrificing for them.
5. **Rules and regulations.** IGT and SGT broaden and elaborate on the concepts of, and distinctions between various rules: norms, regulations, institutional arrangements, rituals, etc.
 - a) as Goffman emphasizes [1969], social rules are an underlying code to human behavior (completely missed by game theory, in which they are not taken into consideration);
 - b) IGT emphasizes particularly ceremonial rules including gestures which influence conduct; often these are seen to have secondary or even no significance in their own right [Goffman, 1969, pp. 53-54]. But the social fabric of trust between people is made up of these ceremonial threads;
 - c) status and power differences are based on asymmetry in rule structure;
 - d) rule systems governing interaction, including strategic interaction, lead to ontological security [Goffman, 1969].
6. **Normative and institutional factors.** These are axiomatic in any sociological approach to conceptualizing interaction, although such factors are totally

missing from classical theory (or they are conflated with the “rules” of material and ecological constraints). In general, in IGT and SGT social norms and institutional factors are an integral part of the description and analysis of game situations [Baumgartner et al., 1975; Buckley, Burns, 1974; Burns, Meeker, 1974; Burns, Roszkowska, 2007; Goffman, 1969]. Goffman writes [Goffman, 1969, pp.114-115]: “For the sociologist, these normative limitations on pure games (...) limitations which ideal (i.e. “classical”) games themselves help to point out – may be the matter of chief interest”.

Goffman identifies a variety of norms operating in any game process. For instance, there are norms prior to any game being played as well as those applied in the multiple phases of an interaction process, for instance [Goffman, 1969, p.114]:

- a) directives (constraints) to play as a part of a normative, institutional context or actors' particular roles in the interaction situation which demand participation in specific interaction situations;
- b) norms influencing actors' choices and payoffs in the interaction situation;
- c) norms supporting commitment to actors' previous moves or promises;
- d) norms providing intrinsic payoffs to players, not just the outcome payoffs [also, see: Burns, Meeker, 1974; Burns, Roszkowska, 2007].

In this sense, a game or interaction situation is “socially embedded” [Burns, Gomolińska, 2000], which is an idea unknown to the classical game theory, as suggested earlier. In the game theoretic and rational choice perspectives, actors adhere to a rule or norm only if it is in their self-interest; that is, it leads to instrumental gains. But IGT and SGT recognize multiple reasons for actors to adhere to norms as well as to other rules in their interactions: mutual long-term commitment to a relationship complying with the norms and third party (group or specialized unit) enforcement, as well as the type of self-interest that is axiomatic to the classical game theory. Of particular interest to Goffman are the rituals and the management of rituals in interaction, even strategic interaction [Goffman, 1969].

7. **Roles.** IGT and SGT apply role concepts to game situations and make distinctions. Goffman develops the roles of “a player” in a game, the player as a “party”, a “pawn”, “token”, “informant”, “spy”. A “party”, for example can be an individual or a group as a player, pawn, token... [Goffman, 1969]. Roles and role relationships in SGT are the bases of a series of conceptualizations and analyses ([Burns, Meeker, 1974; Burns, Roszkowska, 2014, 2007]. Particular roles entail characteristic value orientations, belief or model complexes, action repertoires, and judgment complexes. Role pairs may serve smooth and predictable interactions and interaction equilibria.
8. **Social relationships.** IGT and SGT consider social relationships that have intrinsic value to the participants. Thus, SGT focuses on solidarity relationships, which call for attention in terms of cooperation norms and particular norms of distribution. Thus, close friends could play a prisoners' dilemma game and readily choose the "cooperative pattern" and avoid the asymmetrical choices

as well as the outcome of mutual failure. Many status relationships call for particular patterns of interaction and unequal payoffs; people in a differential status relationship would find the asymmetrical outcome pattern in the PD or other games with asymmetrical outcomes acceptable in a sense that they would be normatively indicated.

SGT considers a wide variety of relationships: friendship, enmity, neutral, relationships institutionalized in groups and organizations such as those entailing leadership. Goffman more or less confines himself to cases where actors do not have established interpersonal relations – but, nonetheless, normative and institutional rules apply to their interactions.

While Goffman emphasizes norms and informal relations among actors, he is alert to the importance of formal institutional constraints and regulations on game behavior [Goffman, 1969, p. 125]. “Under law, a whole range of verbal threats and promises become moves for which actor A can be made liable (...). The uttering of self-disbelieved statement under oath is a punishable offense. So also are verbal discourtesies directed at the courts” (or, in many instances, authorities in general). In this way, even words have their weight in legally regulated institutional contexts (places and times).

A specialized office or a social body of officials maintain standards of conduct and regulate behavior in interaction situations. They make final judgments and institute payoffs. While Goffman does not go on to elaborate and extend his institutional considerations – this is considered to a significant degree in SGT [Baumgartner et al., 1975; Burns, Meeker, 1974].

In whatever ways the norms and institutional arrangements are established and maintained, the IGT and SGT provide language and analytic tools to describe and analyze a wide variety of interaction situations distinguishable by their norms and institutional arrangements. In particular, they readily incorporate the possibilities of communication among players and making binding agreements – which are the bases of so called “cooperative games” in classical game theory. Such games have received very limited treatment in the game theory perspective because the cooperative game framework provides few analytic results, even if cooperative interaction is a major part of all human interaction.

9. **Trust** is recognized in social sciences as a key factor in social life. This is not a main concept which classical game theory recognized or could readily incorporate – although trust, or the lack of trust – would substantially affect actors' behaviour.¹ Goffman focuses particularly on situations of interpersonal trust and the role of interpersonal rituals that are utilized in establishing and maintaining trust [see: Goffman, 1969, 126ff]. He writes, "In the last analysis, we cannot build another into our plans unless we can rely on him to give his work and keep it and to exude valid expression". [Goffman, 1969,

¹ „Trust” is not a natural or comfortable concept in game theory. It can in particular be incorporated in the cooperative game approach [Schelling, 1960; Nash, 1950; Harsanyi, Selten, 1988; Aumann, 1989; Berg et al., 1995; Ting et al., 2005; Harsanyi, Selten, A 1988, among others].

p. 130]. And such trust is based on a social fabric of ceremonial thread. “Only through an ‘acceptance’ of the communication of the other (one another) is maximum collaboration/coordination possible, and hence a maximally effective effort”. This refers to acting as two members of the same team, or having a common project.

10. **Social structuring.** IGT and SGT conceptualize agents as creative and capable of structuring and restructuring games and game components such as the agents (educating them, replacing them), the rule regimes, the action opportunities, the payoffs (for instance, distributional properties). In this sense, games are multi-level games [Buckley, Burns, 1974; Baumgartner et al., 1975] with a higher level structural process operating on the parameters of the lower level game. This is explicitly articulated and applied in SGT, while it is more implicit in IGT. There is no such concept in the classical approach; the game theorist structures any given game on their own.
11. **Empirical relevance.** One of the sustained, principle criticisms of classical game theory has been its empirical irrelevance, the inability to relate to real social life. The sociological approaches of SGT and IGT have demonstrated their effective application in describing, analyzing, and explaining a wide variety of social interactions. The sociological approaches cover many types of games (in some cases games not ever envisioned or envisionable in classical theory and, arguably, in its many direct descendants). For instance, Goffman conducts studies and analyses of gambling casinos, community life, and everyday life interactions: expression-of-self games, games of opposition, games of coordination, negotiation, and contingency, observer-subject games, and interrogation games, as well as a variety of games of deception and fabrication [Burns, Roszkowska, 2008; Goffman, 1969]. Researchers have conducted studies of manufacturing conflict, varieties of exchange interactions, organizational relationships such as supervisor-supervisee, and policy games in diverse fields or sectors [Baumgartner et al., 1975; Buckley, Burns, 1974; Buckley et al., 1974b; Burns, Gomolińska, 2010; Burns, Roszkowska, 2006, 2005].

Comparisons of SGT and IGT point out, on the one hand, the rich variety of situational interactions considered by Goffman: games of secrecy and deception, fabrication and lying, which SGT has not addressed to the same extent. On the other hand, although sociologically informed, Goffman’s approach to strategic interaction fails to systematically distinguish a number of social relational and institutional forms – which were also totally neglected by classical game theory – such as relations of close friendship and intimacy, solidarity, enmity, hierarchy, market, and state-citizen relations; in addition, diverse cases of negotiation and conflict resolution have been a particular focus of SGT. While IGT considered moral and normative aspects of interaction only superficially, these subjects have been given substantial attention in SGT – and have resulted in concepts of normative equilibria, moral dilemmas, normative-instrumental dilemmas, and distributive justice issues [Burns, Roszkowska, 2005, 2008, 2009; Burns et al., 2014].

5. Conclusion

We have presented two overlapping initiatives to develop a sociological and social science game theory – with an emphasis on social and material contexts, rules including norms and institutional arrangements, a wide repertoire of actions including communication, diverse forms of cooperation and conflict, making binding agreements, and also strategic actions and interactions.

This development provides a substantial alternative to classical game theory with its anomic, immoral and uncreative rational choice actors, lack of explicit (and specifiable) norms and institutions, and without capacities of restructuring and transformation. Instead of hyper-rationality, hyper-knowledge, anomic relations, and actors without agency, the sociological variants have investigated – and enabled the investigation and analysis of – games involving creative, interpretive, transformative agents, interacting in their diverse institutional, ritualistic, and face-to-face contexts.

Both sociological theories have been empirically applicable to real life situations. Goffman focuses mainly on face-to-face interaction situations with an emphasize on ritual but also genuine strategic behavior in the classical game sense; SGT focuses more on normatively and institutionally regulated interactions among parties involved in friendship, collaboration and exchange as well as diverse negotiation processes.

The sociological toolbox provides a systematic basis to describe, analyze, understand and explain patterns of interaction, their stability and transformation. In some cases, predictions of interaction patterns are possible because institutional arrangements and normative orders are stable. Interaction conditions can be specified that are likely to lead to stable patterns on the one hand, or to unstable patterns and disorder on the other.

All the tools of sociology and social sciences are readily and easily incorporated in the model – and ultimately in what will become general theory – and applied empirically and policy-wise. The emerging sociological game paradigm suggests multiple *challenges* and opportunities for further development.

The authors' participation in the preparation of the article

Professor Tom R. Burns – conceptualization and design, theory development, overview of literature – 50%

Ewa Roszkowska, PhD, Professor of University of Bialystok – conceptualization, technical preparation, overview of literature – 30%

Ugo Corte, PhD – overview of literature – 10%

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