

Dynamic Social Impact and the Evolution of Social Representations: A Natural History of Stereotypes

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It should be evident by now that, like cells and organisms, populations are kept together and integrated by systems of communication. (MacArthur & Connell, 1966, p. 119)

Although the term *artificial life* was coined less than a decade ago to describe “the study of man-made systems that exhibit behaviors characteristic of natural living systems” (Langton, 1989, p. 1), social scientists had long before begun studying the man-made systems of values, beliefs and behaviors that comprise a culture. With others, we suggest that these mental entities emerge, develop, and evolve in ways not unlike organic entities (Boyd & Richerson, 1994; Hull, 1988). In this paper, we apply this evolutionary metaphor to social representations, a form of culturally shared belief exemplified here by group stereotypes. Our purpose is to show how dynamic social impact theory (DSIT) and an evolutionary perspective offer new ways of understanding the emergence, integration, maintenance, and change of social representations through communication.

We first outline the metatheoretical perspective that social representations emerge as structure in self-organizing systems, the result of individual-level communication dynamics. DSIT explains how social representations become organized into cognitive bundles and distributed through social space. We then explore ways in which DSIT might be further informed by the dynamic processes of biological self-organizing systems. In doing so, we consider the ways in which social representations are responsive to dynamic processes analogous to those underlying the evolution of species and population fluctuations within biological ecosystems.

Social Representations as Self-Organizing Systems

Social representations are knowledge structures comprised of beliefs—in the case of stereotypes, beliefs about the attributes of groups. Social representations

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are not merely individual cognitions, however, they are consensually shared across large numbers of people within a culture (Stangor & Schaller, 2006). Decades of research now offer a rich account of the individual-level cognitive existence of stereotypes and other social representations, but there remains much that is unknown about their social existence as dynamic, consensually shared cultural phenomena.

"Self-organization denotes a process by which a structure or pattern emerges in an open system without specifications from an outside environment" (Barton, 1994, p. 7). For our purposes, three crucial characteristics define the structures emergent through a self-organizing process:

1. The structures define an aggregate entity.
2. These structures are determined not by forces operating on the aggregate entity per se, but by processes operating on the lower-order entities that make up that aggregate.
3. The nature of those self-organizing processes is not purposive; rather, the eventual higher order structure is an unintentional, yet inevitable, by-product of lower order processes.

The building blocks of social representations exist in the form of individual cognitive structures that vary considerably from person to person, and are differentially likely to be successfully communicated. For example, one person might endorse the belief that men are less sensitive than women, another may believe that men are equally or more sensitive, and a third may have no opinion on this topic but think that men are more rational or more assertive than women. These beliefs do not exist in isolation but are shared through many communication media, ranging from individual discourse to mass distribution (van Dijk, 1987). Not all beliefs are shared with equal effectiveness, as we shall discuss later. Those factors that affect communication also affect the content and distribution of social representations.

The self-organization perspective emphasizes the crucial role of communication, unlike most psychological approaches that presume consensus to result from similar motivational, perceptual, and cognitive processes embedded in the minds of individuals. This presumption begins to appear incomplete when one considers relevant research revealing that individual-level processes in the absence of communication rarely lead to impressive degrees of consensus in knowledge structures and beliefs (Boster, 1991).

DSIT and the Self-Organization of Social Representations

Three features of dynamic social impact theory are relevant to exploring the self-organizing nature of social representations: (a) it focuses on dynamic, mutually influencing populations of individuals; (b) it models the emergence of system-level regularities over time; (c) it accords a fundamental role to individual-level communication. The theory has been examined in both empirical studies and computer simulations, and although not designed specifically to test hypotheses concerning such social representations as stereotypes, the results offer

insights into two of their fundamental and underresearched aspects: distribution and content.

Even the most pervasive "consensual" stereotypes of ethnic groups are endorsed by something less than 100% of people (Katz & Braly, 1933). Stereotypes of any given target group may be similar within particular geographic or social bounds, but differ importantly across the broader canvas of social space. Few, if any, psychological theories of stereotypes speak directly to this issue. A preliminary understanding of the distribution of stereotypic attitudes can be offered by the processes of dynamic social impact. As a result of the self-organizing dynamics of DSIT, individual knowledge structures that are initially distributed randomly across a social space become, over time, distributed into clusters that define cultural knowledge or beliefs (Latané, this issue). DSIT thus offers a very simple set of rules through which we can understand why cultural stereotypes are generally, but not perfectly, consensual and how they may differ from region to region.

Another fundamental yet largely unexamined facet of stereotypes is the manner in which they operate as implicit personality theories (Ashmore, 1981). That is, stereotypes ascribe multiple attributes to a particular group, and those attributes are themselves perceived to be correlated. A particular ethnic group might be stereotyped as both unintelligent and dirty, for instance. DSIT offers one explanation as to how two logically dissociated attributes come to be associated within the context of the cultural stereotype. Over time, two initially unrelated beliefs that are randomly distributed across social space can become bundled, or correlated (Latané, 1996b; Lavine & Latané, this issue). Thus, DSIT can account for the fact that group stereotypes exist not simply as specific beliefs about specific group attributes, but as coherent implicit personality theories shared by large numbers of people.

These coherent bundles of attributes can be considered to develop lives of their own (Huguet & Latané, this issue). Although cultural stereotypes are influenced importantly by the aggregate actions of populations, their continued existence in a culture is not tied in any direct way to the specific actions of any single individual. Thus, the existence and function of social representations in a sociocultural system is not unlike the existence and function of species in a biological system.

Social Representations as Species

The attributes of a biological species constitute a certain structure that defines that species as distinct from others. The genetic and behavioral processes that determine the attributes of a species do not operate directly on the species itself, but on its individual members. No species deliberately attempts to evolve toward any specific set of attributes, and yet specific sets of attributes do indeed emerge. Just as a biological species is defined by a coherent bundle of attributes, so, too, is a stereotype. Each specific aspect of a stereotype (e.g., men are assertive; professors are absentminded) is analogous to a gene. Just as the bundles of physiological attributes characteristic of biological species manifest

themselves in specific individual organisms, the bundles of beliefs characteristic of a stereotype manifest themselves in the minds of specific individual people. Thus, each individually held stereotype is analogous to an individual member of a particular species. Putting it all together, the emergence and evolution of cultural stereotypes may follow processes very much like the emergence and evolution of biological species by natural selection.

The Evolution of Social Representations

Biological species emerge and evolve because of selective pressures on organisms that operate through the biological communication of genetic information to new organisms. Cultural stereotypes emerge and evolve because of selective pressures on individual people that operate through the communication of stereotypic information to other people. A consideration of the selective pressures operating on communication processes offers a new twist on the "functionalist" approach to stereotypes.

Psychological research has identified a number of functions served by stereotypes (Stangor & Schaller, in press), but those considerations do not tell us why some but not other stereotypes exist. Why, for instance, are men stereotypically perceived to be assertive and insensitive, but not slim-hipped, ingratiating, or wealthy? The evolutionary perspective suggests that successful stereotypes have proven themselves more adaptive than others. Within biological systems, a gene is adaptive to the extent that it is linked to phenotypic features or behaviors that facilitate the communication of that gene to other organisms. For a particular aspect of a stereotype to be adaptive, it must be associated with behavior that enhances the likelihood that the stereotypic belief persists in the mind of an individual and is replicated in the minds of other individuals.

At least three dimensions influence whether a stereotypic trait is likely to persist in the mind of an individual: (a) the correspondence of the trait to observable, confirming instances, (b) the noncorrespondence of the trait to observable, disconfirming instances, and (c) the utility of the trait in defining a social group as distinct from a different group.

Given that individuals are motivated in part by a desire to accurately predict their environment, stereotypic beliefs that do not correspond to observable, confirming instances of behavior are not likely to be sustained. To remain as components of social representations, stereotypic traits must be general enough to be informed by multiple behavioral referents that can be readily observed. Rarely are stereotypes composed of traits that are tied to only one behavioral referent (e.g., ax-wielding), or that cannot be directly inferred from a predictable set of behaviors (e.g., ingratiating).

Similarly, traits that become entrenched in stereotypes also tend to be difficult to disconfirm. Unfavorable traits are most resistant to disconfirmation (Rothbart & Park, 1986) and also may be most common in cultural stereotypes and less likely to change over time. Finally, there is evidence that those traits most likely to become stereotypic are those that most efficiently distinguish one

group from another (Ford & Stangor, 1992).

Although this functional analysis does suggest that stereotypes based upon some descriptive difference between groups are more likely to be perpetuated than stereotypes that are clearly false, it does not imply that stereotypes must contain a kernel of truth. Many objectively false stereotypes of disadvantaged groups may be based in part on apparent (but not inherent) group differences in behavior, performance, or circumstances. In addition, because of psychological biases toward confirmation rather than disconfirmation of existing beliefs, many objectively untrue stereotypes fail to be extinguished even in the face of overwhelming counterevidence.

In order to be adaptive, a stereotypic belief must not only survive in an individual's mind, but must replicate in the minds of other individuals. Stereotypic beliefs replicate through the processes of interpersonal communication, but not all stereotypic beliefs are equally likely to become part of social discourse. Whether a stereotypic trait is likely to be communicated depends, in part, on whether the trait is able to be communicated simply and efficiently, and whether it is perceived to be relevant and informative. Many negative or positive beliefs about individuals members of groups are likely to be based on gut reactions to behaviors or characteristics that are not consciously identifiable (Lewicki, 1985). Although these characteristics may be the locus of the emotional reaction, these characteristics may not be communicated to others, and will not become central to cultural stereotypes. Instead, more reasonable-sounding characteristics will—even if they are untrue. Perhaps even more important in influencing whether a stereotypic trait is replicated is whether it is believed to be informative or relevant (Grice, 1975). For instance, it is rarely either informative or relevant to tell others that men on average are taller or more slim-hipped than women.

Even successfully replicating and consensually held stereotypes may face pressures to change, however. Just as biological species may adapt to changing natural environments, cultural stereotypes may change in the face of fluctuations in the cultural environment. Members of negatively stereotyped groups may overcome stereotypic expectations in spectacular and salient ways; laws may be enacted that allow greater privilege to previously disenfranchised groups; perceivers may begin to have greater contact with members of stereotyped groups. Changes such as these are usually assumed to form a necessary condition to the revision of stereotypic beliefs. The biological metaphor suggests, however, that wholesale revision may not occur. In adapting to changing environments, species are not simply replaced with a different species. Rather, speciation occurs, through which new species emerge in addition to the old ones. Similarly, it is likely that in response to a changing social reality, stereotypes will speciate as well. Old stereotypes are not likely to become extinct; instead, new stereotypic beliefs may emerge alongside the old ones.

This last consideration implicates the importance of dynamic self-organizing processing not only in the evolution of social belief systems, but also in the evolving structure of social space. Group stereotypes not only help people make sense of their social world, they may also influence who talks to whom

and how carefully they listen. Just as the process of speciation reduces the degree of "communication" among genes, stereotypes and other belief systems can divide populations into self-isolating subgroups. Thus, the development of stereotypes may change the very structure of social space, allowing diversity to become a pronounced and stable aspect of the cultural environment.

The Ecosystem of Social Representations

Biological species do not exist in isolation from other species, but live in ecosystems comprised of populations of different species. Like populations in an ecosystem, social representations do not exist in isolation from each other. In any culture, there exist stereotypes of many different groups, and there may exist different stereotypes of any one group. Just as one must consider biological ecosystems in order to appreciate the fluctuations and changes in populations of species over time (Cockburn, 1991), one must consider some analogous "social ecosystem" in order to understand the fluctuations and changes in cultural stereotypes over time. Three ecosystem dynamics seem particularly relevant to stereotypes: coevolutionary processes, competitive relationships among species, and succession of species over time.

Coevolution

A particular gene in a particular species may be adaptive only when it exists in combination with a different gene in a different species occupying the same ecosystem. Numerous examples of coevolution exist in biological ecosystems. Certain features of cultural stereotypes also may be mutually sustaining in analogous ways, for instance, stereotypes that describe men as assertive and women as submissive. Existing together, these two stereotypes function to maximize the distinction between men and women. In the absence of the other, neither stereotype would be as compelling and would be, therefore, less likely to be communicated to other people.

Disparaging stereotypes of different minority groups also may be mutually sustaining. Consider stereotypes that describe both African-Americans and Hispanics as lazy. The coexistence of both stereotypes suggests the broader generalization that people of color are lazy, thus making it more likely that individuals will believe both stereotypes. In addition, the two stereotypes are likely to be semantically and affectively linked in individual memory. Consequently, the activation of one stereotype is likely to activate the other stereotype as well, again increasing the likelihood that both stereotypes will be perpetuated. These considerations are consistent with research results indicating that people who are prejudiced against any one particular minority group are more likely to be prejudiced against other out-groups as well (Crandall, 1994).

Competition

Many species maintain competitive relationships within an ecosystem, whether they be predator and prey, or merely competing for the same sustaining re-

sources. Similarly, different stereotypes of any single group might also be viewed as being in competition—competition for lasting representation in individual minds and across the social landscape. For example, the stereotype of women as weak, submissive, and irrational is in competition with the belief that women can be at least as strong, assertive, and sensible as men. We might understand variations and change in cultural stereotypes as responsive to competitive dynamics similar to those underlying biological ecosystems.

For instance, it appears that in many bounded ecosystems, population sizes of competing species fluctuate around some equilibrium (MacArthur & Wilson, 1967). As the population size of one species grows and the size of a competing species decreases, certain environmental constraints conspire to reverse those trends. Consequently, the less populous species gains numbers while the more populous species decreases in size. This trend continues until environmental pressures act once again to reverse these trends. Analogous dynamics may govern fluctuations in the “population size” of stereotypes. For instance, as a negative stereotype of women becomes increasingly common, and a positive perception rare, the remaining individuals holding the minority perspective are likely to be those who most strongly hold that perspective. As a result, they are likely to be more able and motivated to defend that perspective, and to convince others that their perspective is true. Status as a less-populous cultural stereotype precipitates certain communicative and persuasive advantages that help to replicate that stereotype across the social landscape. Rather than reaching a point of static equilibrium, the distribution of stereotypic beliefs—like biological populations—may fluctuate around an equilibrium.

Succession

Finally, consider the dynamics of species succession within ecosystems. Over time, there is greater turnover in the number and type of species colonizing a favorable, resource-rich environment (e.g., a forest) than in the species colonizing a harsh environment (e.g., a desert). As a result, the “climax community” in a harsh environment may be little different from the community of original biological colonizers; in contrast, the climax community in a favorable environment rarely consists of the original colonizers (MacArthur & Connell, 1966). The distinction between favorable and harsh environments may also apply to the social environments within which cultural stereotypes clash for acceptance and survival. Certain social environments are rich in the communication-based resources that sustain and fertilize novel, rare, or unpopular beliefs about groups (e.g., freedom of speech, legally protected tolerance of alternative beliefs, and access to unregulated mass media). Harsher environments may tolerate fewer species of stereotypes in general, and there may be little or no change over time in the dominant cultural stereotypes.

This line of reasoning offers a moderating perspective on sociological models hypothesizing that cultures progress through certain stages of change in the acceptance of ethnic minority groups (e.g., Blumer, 1965; Kleinpenning & Hegendoorn, 1993). Such models imply gradual extinction of negative stereotypes of minority groups. The ecosystem analogy suggests that stage models

such as these may apply only in cultures that provide a favorable environment for the communication of novel or unpopular beliefs.

The Evolution of Dynamic Social Impact Theory

These speculations move beyond existing formulations of DSIT. Nevertheless, they are consistent with the general thesis of DSIT, in that culturally shared beliefs are viewed as structures emerging in self-organizing systems. Indeed, DSIT itself might be viewed as an emergent knowledge structure evolving within the culture of social science. DSIT offers a flexible paradigm through which our various biologically informed hypotheses might be tested. Consider the harsh-favorable environment hypothesis. The societies modeled in prior DSIT research (Latané & Nowak, in press) might be considered harsh environments: Parameters were set in such a way to preclude any spontaneous inception of new beliefs or ideas within the majority population, and there was no opportunity for communication except between neighboring individuals (e.g., no mass communication strategies). These results are consistent with the hypothesis that, under harsh social conditions, cultures do not progress through prescribed stages toward the acceptance of minority viewpoints (e.g., counter-stereotypical beliefs). By adding or changing model parameters, one could test directly the hypothesis that change in stereotypical beliefs would be more rapid and perpetual under favorable social conditions that support greater numbers of competing stereotypes and afford the possibility of unrestrained communication across the social space.

Conclusion

It should be evident by now that—like cells, organisms, and biological populations—cultural stereotypes and other social representations are kept together and integrated by systems of communication. Social representations can be fruitfully thought of as species—aggregate autonomous entities that are subject to selection pressures not unlike those affecting organic life forms. Many other forms of cognition have the same socially emergent, self-organized character, including attitudes, ideologies, and norms. Stereotypes offer a particularly interesting case, because stereotypes help shape and channel social space by affecting who communicates to whom, and about what. Thus they have the capacity to change the environment in which they and other forms of social representation adapt and evolve. Social scientists might gain new insights into the nature of stereotypes and other socially shared knowledge structures by exploring the self-organizing dynamics of biological populations. These dynamics can be mined for metaphors that generate novel perspectives and new hypotheses, and which can be tested within the rigorous yet flexible context of dynamic social impact theory. This strategy of inquiry in communication dynamics may lead to a better, more complete understanding of the natural history of social representations and other elements of culture.

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