A

ACTOR NETWORK THEORY

Actor network theory (ANT), also known as enrolment theory or the sociology of translation, emerged during the mid-1980s, primarily with the work of Bruno Latour, Michel Callon, and John Law. ANT is a conceptual frame for exploring collective *sociotechnical* processes, whose spokespersons have paid particular attention to science and technologic activity. Stemming from a Science and Technologies Studies (STS) interest in the elevated status of scientific knowledge and counter to heroic accounts or innovation models, ANT suggests that the work of science is not fundamentally different from other social activities. ANT privileges neither natural (realism) nor cultural (social constructivism) accounts of scientific production, asserting instead that science is a process of heterogeneous engineering in which the social, technical, conceptual, and textual are puzzled together (or juxtaposed) and transformed (or translated).

As one of many anti-essentialist movements, ANT does not differentiate between science (knowledge) and technology (artifact). Similarly, proponents do not subscribe to the division between society and nature, truth and falsehood, agency and structure, context and content, human and nonhuman, microlevel phenomenon and macrolevel phenomenon, or knowledge and power. Nature and society, subjectivity and structure, and fact and fiction are all effects of collective activity. ANT advances a *relational materiality,* the material extension of semiotics, which presupposes that all entities achieve significance in relation to others. Science, then, is a network of heterogeneous elements realized within a set of diverse practices.

THE ACTOR IN ANT

Taking seriously the agency of nonhumans (machines, animals, texts, and hybrids, among others), the ANT network is conceived as a heterogeneous amalgamation of textual, conceptual, social, and technical actors. The "volitional actor" for ANT, termed *actant,* is any agent, collective or individual, that can associate or disassociate with other agents. Actants enter into networked associations, which in turn define them, name them, and provide them with substance, action, intention, and subjectivity. In other words, actants are considered foundationally indeterminate, with no a priori substance or essence, and it is via the networks in which they associate that actants derive their nature. Furthermore, actants themselves develop as networks. Actors are combinations of symbolically invested "things," "identities," relations, and inscriptions, networks capable of nesting within other diverse networks.

THE NETWORK IN ANT

The terms *actor* and *network* are linked in an effort to bypass the distinction between agency and structure, a core preoccupation within sociology (as well as other disciplines). This distinction is neither useful nor necessary for ANT theorists, as macrolevel phenomena are conceived as networks that become more extensive and stabilized. Networks are processual, built activities, performed by the actants out of which they are composed. Each node and link is semiotically derived, making networks local, variable, and contingent.

Analytically, ANT is interested in the ways in which networks overcome resistance and strengthen internally, gaining coherence and consistence (stabilize); how they organize (juxtapose elements) and convert (translate) network elements; how they prevent actors from following their own proclivity (become durable); how they enlist others to invest in or follow the program (enroll); how they bestow qualities and motivations to actors (establish roles as scripts); how they become increasingly transportable and "useful" (simplify); and how they become functionally indispensable (as obligatory points of passage).

THE THEORY IN ANT

ANT is considered as much a method as a theory; anti-essentialism informs both the conceptual frame used for interpretation and guides the processes through which networks are examined. ANT advances three methodological principles. The first is *agnosticism,* which advocates abandoning any a priori assumptions of the nature of networks, causal conditions, or the accuracy of actant's accounts. ANT imposes impartiality and requires that all interpretations be unprivileged. The second principle is *generalized symmetry,* employing a single explanatory frame when interpreting actants, human and nonhuman. Investigators should never shift registers to examine individuals and organizations, bugs and collectors, or computers and their programmers. The third is *free association,* which advocates abandoning any distinction between natural and social phenomenon. These distinctions are the effects of networked activity, are not causal, and cannot provide explanation.

In line with its ethnomethodological roots, ANT theorists describe networks by "following the actor" into translations. Interested in contextual conversions as well as alterations in content, ANT advocates entering scientific debates prior to closure, examining *science in the making.*

THE CORE CONCEPT: TRANSLATION

For ANT theorists, the "success" of science is attributable to the ability of scientific networks: to force entities to pass through labs or clinics in order to harness "scientific evidence" within disputes; to translate materials, actors, and texts into *inscriptions* that allow influence at a distance; and to organize as *centers of translation* where network elements are defined and controlled, and strategies for translation are developed and considered.

Within all sociotechnical networks, relational effects result from disputes between actors, such as attempts at the advancement of a particular program, which necessarily results in social asymmetry. Therefore, ANT can also be considered a theory of the mechanics of power: the stabilization and reproduction of some interactions at the behest of others, the construction and maintenance of network centers and peripheries, and the establishment of hegemony. Rather than power as possession, power is persuasion, "measured" via the number of entities networked. Power is generated in a relational and distributed manner as a consequence of *ordering struggles.*

Central to ordering struggles is the concept of displacement, inherent in the process of translation. Translation (transport with deformation), as distinguishable from diffusion (transfer without distortion), is both a process and effect. Scientific knowledge and artifacts are translated as networks become more extensive and/or concentrated and as subsequent iterations emerge. Network actants, as well as the relations that bind them, are translated as networks change. Thus, translation is the process of establishing identities and the conditions of interaction, and of characterizing representations.

However, translation is always at the same time a process of both social and physical displacement. Network elements deviate from previous inclinations are converted to *inscriptions* or *immutable mobiles* (combinable textual, cartographic, or visual representations that remain stable through space and time), are defined and ascribed roles, and are mobilized and/or circulated through translation. The realization of a set of networked possibilities entails that others are always unrealized. As effect, translation orders, and produces society and agency, nature and machine.

Translation is the process of converting entities, of making similar (such that one entity may be substituted for another) or simplifying (black-boxing or translating network elements into a single block) while retaining difference (translation is not simply transfer). In this sense, translation is also *betrayal,* of origins and of solidity. In short, translation is both a practice (making equivalent) and an outcome (both realized effects and the displacement of alternative possibilities), understood in terms of the translator, the translated, and the translation medium.

Networks characterized by a high level of *convergence* are those that demonstrate agreement as a result of translation. That is, converged networks are those that are both highly aligned and coordinated. *Alignment* describes the degree to which networks are defined by a common history and a shared space. *Coordination* refers to the adoption of convention, codification, and translation regiments. Tightly converged networks may also demonstrate strong *irreversibilisation.* The degree of irreversibility a network demonstrates refers to the capacity to return to a previous iteration of the network, as well as the degree to which subsequent translations are determined. Tightly converged and highly co-coordinated networks are, in other words, those that are simplified through translation.

Simplified networks, when resulting in single-point actants, are those that are *punctualized* or are *black-boxed.* Punctualized networks are considered only in terms of their input and output, are "taken for granted," or are counted as resource. Computed axial tomography (CAT) scans, despite their internal complexity; genes, despite their controversial nature; or the National Academy of Sciences, despite the expanse of entities enrolled, may become black-boxed.

Black boxes, however, may always be reopened. Networks demand continual maintenance because order is always provisional. As a set of dynamic alliances, networks are subject to possible desertion or competitor recruitment. Furthermore, the stabilization of a network, however temporary, involves the successful dismissal an *antiprogram* through prevailing in a *trial of strength* (the direct confrontation of a claim or a spokesperson). A *spokesperson*

speaks on the behalf of others, the entities he, she, or it constitutes (animals or machines who do not speak or masses of humans who defer to the spokespersons). Thus, spokespersons simplify networks of others (who may or may not consent) by representing their interests, attributing identity, establishing roles, and advancing a course of action. Outside actants may challenge a network's spokesperson (the validity or reliability of the representation) or confront an advanced claim (the "truthfulness" of the assertion or the efficacy of its measurements). Thus, domination is inherently both contestable and reversible.

SITUATING ANT

Emerging during the mid-1980s, ANT was situated within the sociology of science and technology. Traceable through semiotics/structuralism and into poststructuralism, ANT shares some similarities with Foucauldian material-semiotics and borrows from his conception of power/knowledge.

One can also identify parallels between Deleuze and Guattari's conception of the assemblage and the ANT network as dispersed, dynamic, performative, and topographical. Theorists have also remained faithful to ethnomethodology, acknowledging the built nature of sociotechnical networks and advocating an examination of the taken for granted.

Throughout the 1980s, ANT had not coalesced into a single theoretical perspective. Theorists presupposed that advancing a single set of principles was counter to the desire to sustain ANT as a diverse and dispersed set of practices with transformative properties. However, because of the portability of its fundamental concepts, ANT became a *fixed center* or *obligatory point of passage* by the mid-1990s. Essentially, ANT was black-boxed.

Throughout the latter part of the twentieth century and into the twenty-first, ANT was scathingly criticized: (1) as managerialist, (2) as emphasizing Nietzschean mastery, (3) as Machiavellian, (4) as colonizing "the other," (5) as antihumanist, and (6) as representing the powerful. By the end of the century, proponents engaged in a number of reactive/next-stage strategies. Some theorists advocated fundamental transformations. For example, recognition of the generative and corroborative potential of networked description led to the elevated import of decentering as vital to centering and "the other" as essential to network consolidation. Other representatives merged ANT with additional theoretical perspectives; ambivalence, oscillation, performance, and mobility surfaced as networked possibilities. Finally, sensitive to the betrayal of origins, Latour (1999) simply advocated, "abandoning what was wrong with ANT, that is 'actor,' 'network,' 'theory' without forgetting the hyphen" (p. 24).

— Cassandra S. Crawford

See also Ethnomethodology; Latour, Bruno; Semiology; Social Studies of Science

FURTHER READINGS AND REFERENCES

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AFFECT CONTROL THEORY

Affect control theory links social identities, actions, and emotions in a control system. In a control system, the processes operate to maintain a reference level (like a thermostat setting). In affect control theory, the reference levels are the affective meanings that are linked to labels for identities and actions. People learn these meanings (how good, how powerful, and how active things are) from their cultures. When they enter social interactions, they define situations with verbal labels, such as "I'm a teacher, and the person entering my office is an undergraduate student." The act of thinking about the situation in that way automatically evokes meanings about what teachers and undergraduate students are like on the three dimensions of goodness, powerfulness, and activity levels. The basic principle of affect control is that people expect, enact, and interpret actions that will *maintain* these culturally given meanings for the social identities and actions that occur in the situation. David R. Heise developed the theory from Charles Osgood's work on the semantic differential as a method for measuring affective meanings, from Harry Gollob's research on impression formation, and from William T. Power's control theory of perception.

The maintenance of meaning is what makes affect control theory a control system: The culturally learned meanings are stable aspects of how we think about our social world, and