Emergence, Networks, and Zeitgeists: Developing the Theory of Justification in Organizations With an Agent-Based Model

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Abstract

Justification shifts information from the individual to the intersubjective level and then, by emergence, to the collective level, transforming it during processes of inquiry. Simulations of inquiries with an agent-based model suggest that justificatory information on the collective level follows a pattern of convergence over time and that the degree of convergence changes with representation variety, structural features of communication networks, information-adding devices, and inter-level feedback loops. Some empirically testable propositions are derived, and areas of further theoretical development and research around social network, psychological, and behavioral factors are indicated.

Keywords: agent-based models; computational modeling; economies of worth; emergence; justification; theory development

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The theory of justification (Boltanski & Thévenot, 2006 [1991]), often called *economies of worth* and related to the fields of pragmatic sociology and the economics of conventions, models how actors define, evaluate, and represent to each other past and future situations of coordinated action.

Organization and management research shows that such definitions, evaluations, and representations evolve on the collective level through mechanisms of emergence (Gkeredakis, 2014; Miranda et al., 2015) and that they are shaped by environmental features that can be contested in conditions of normative pluralism, including representation variety (Barros & Michaud, 2020; Dionne et al., 2019; Gond et al., 2016), communication structures (Barros & Michaud, 2020; Reinecke, 2010), information-bearing devices (Chenhall et al., 2013; Mercier-Roy & Mailhot, 2019), and informational cues about consensus views (Anesa et al., 2024). This paper aims to define justification more precisely in terms of emergence processes unfolding under environmental constraints and subjected to environmental shocks (Kozlowski et al., 2013).

Propositional precision and specificity can improve the understanding of justification, a phenomenon through which important consequences are realized for organizational and inter-organizational coordination, institutional legitimacy, and power, as research also shows (Cloutier et al., 2024; Grattarola et al., 2024). Thus, the paper asks: 1) What patterns of information emerge on the collective level from justificatory activity? 2) What relations apply between information patterns, representation variety, and structural features of communication networks? 3) What are the effects of adding information through devices and feedback loops?

The approach is to build on prior results of interpretive qualitative methods by using a data-intensive quantitative method (Kozlowski et al., 2013). A theoretical model of inquiry—the process in which actors exercise justification—is synthesized from the literature. The theoretical process model is then translated into a computational model (a procedural algorithm) which is implemented as an agent-based model (a computerized simulation). Finally, inquiries are simulated under various virtual experimental treatments.

Simulations show that justificatory information follows a consistent pattern of convergence, with the degree of convergence changing with environmental features.

Several propositions, open to empirical testing, are derived. The limitations of the model and related opportunities to expand justification theory and research around social network, psychological, and behavioral factors are then discussed.

Conceptual Materials

Justification and Inquiry

Justification is the act of presenting reasons for doing or believing something, including for legitimizing organized activity (Boltanski & Thévenot, 2006; Susen, 2017). The act of presenting reasons *against* something will hereafter be called critique and treated as a thing of the same kind as justification, but with an opposite 'sign.'

Justifications (critiques) are important when contingencies (for example, production scheduling problems in a factory) disrupt the "sense of reality" which the "partners" in action (the factory's managers and workers) rely on to act coordinately (orderly industrial production), thus inaugurating a "crisis" (Boltanski & Thévenot, 2006, pp. 350). The crisis compels partners to stop what they are doing and reflect about it (Boltanski & Thévenot, 1999) to jointly reconstitute the sense of reality through "inquiry" (Boltanski & Thévenot, 2006, p. 351), that is, a process of formulating, exchanging, disputing, and modifying reasons for (against) interpreting and reacting to the situation in different ways. Crises are not necessarily existential; they can arise over mundane issues. They include cases in which the problem is not that coordinated action is not working now, but that it is not obvious how it is going to work in the future, such as with new strategies, policies, or organizational designs.

While "sense of reality" powerfully evokes what is at stake in the process, inquiry may be interpreted more specifically through the lens of social cognitive psychology as an information-enhancing process. In uncertain situations, deprived of functioning norms for coordination and unsure of the intentions of others, partners must "bridge the gap between norms and mind reading" (Mercier & Sperber, 2017, p. 186). This requires an effortful exchange of "justificatory reasons […] for defending or criticizing thoughts and actions, for expressing commitments, and for creating mutual expectations" (Mercier & Sperber, 2017, p. 190). Justificatory (critical) efforts cause information to filter through the cognitive mechanisms protecting the partners against misinformation (Mercier & Sperber, 2017). Differently put, inquiries augment the information that the partners possess individually and collectively and increase its perceived reliability.

Encodings and Reports

The information circulating in inquiries takes the form of descriptive and evaluative "reports" on the problematic situation that actors face (Boltanski & Thévenot, 2006, p. 138). Reports, often extensive and articulated, express reasons for *coding* the situation in a certain way. "Coding" (Boltanski & Thévenot, 2006, p. 4) means categorizing and evaluating the situation through two types of cognitive operations. The first is *generalization*: identifying the situation at hand as an instance of a general type. The second is *qualification*: assessing the coherence and appropriateness of the arrangement of persons, objects, and practices in the situation, given its general type (Boltanski & Thévenot, 2006).

In these terms, inquiries are intersubjective contests around alternative ways of coding the situation at hand. Justification theory infers and formalizes the rules of such contests: the requisites for valid, legitimate, or defensible reasons, in the form of a *grammar*, and the interactions through which reasons can be contested, in the form of a *pragmatics*.

Individual Level: Grammatical Reasons

To stand inquiry, reasons must be intelligible, objective, and generalizable (Boltanski, 2012 [1990]; Boltanski & Thévenot, 2006). Differently put, they must be well-formed, that is, conforming to "requirements resembling those of a grammar" (Boltanski & Thévenot, 2006, p. 140). The competence to produce well-formed reasons is a universal cognitive trait, in some ways analogous to linguistic competence (Boltanski, 2012). Normally socialized and functioning individuals possess it. Whether and how effectively they use it in specific occasions may be a matter of motivation and capacity (Boltanski & Thévenot, 2006) but, if they do use it, then their reports can be assumed to be grammatical (or promptly repaired or withdrawn when they are not).

Well-formed reasons are structured over one or more dimensions, out of a finite set available to all members of a broadly intended culture. In the grammatical model of justification, the dimensions are represented by *common worlds*: six ideal models of collective coordinated action (in contemporary Western societies), each traceable to a distinct conception of justice and described in terms of "categories defining subjects […], objects […], qualifiers […] and relations" of social practices (Boltanski & Thévenot, 2006, p. 140). Common worlds anchor generalizations: a problematic situation is recognized as a plausible instance of one or more common worlds; such recognition may come with a critique of generalizations that are based on other common worlds (Boltanski & Thévenot, 2006). In this sense, every dimension in a reason—corresponding to a different common world—is signed (‘positive’ or ‘negative’).

Signed codes can take different values. Once it is generalized in terms of a common world (or more than one), a problematic situation is evaluated in terms of the coherent or appropriate arrangement of its elements—particularly the ranking of persons, or *order of worth*—taking as a standard the ideal practice of the common world in question (Boltanski & Thévenot, 2006). Depending on where they direct their attention, different actors can code the situation differently. For example, a problem of production scheduling—a situation that can be represented in the terms of the “industrial” common world, in which efficiency is the relevant principle of justice—might be laid by some at the door of incompetent managers, while others may point to the fact that workers on the factory floor have relevant information that does not find its way up the hierarchy. While efficiency remains the applicable (‘positive’) evaluative principle, different encodings imply competing approaches to restoring efficiency and a just order of worth: for example, replace the managers with more worthy ones or improve the information system to give managers the data they need to exercise their function.

Intersubjective Level: Pragmatic Disputes

Once they are expressed in reports, differences among reasons must be resolved. Actors in inquiry *dispute* the reports of others dimension by dimension, an activity that can cause reports to be modified. Disputes are intersubjective and can be described in the terms of a “pragmatics” (Boltanski & Thévenot, 2006, p. 349).

Some disputes are *contentions* over “the equitability of the way worths have been distributed in the situation at hand” (Boltanski & Thévenot, 2006, p. 133). Generalizations and principles of justice are not in dispute, but qualifications and orders of worth are. Contentions can be resolved through *tests* comparing the current arrangement of the situation to the ideal practice of one common world. In tests, actors assert their reasons and support their assertions with proofs involving practical resources (such as the production planning information system) (Boltanski & Thévenot, 2006). Tests, in other words, “bear upon the factual nature of the elements that have been invoked to establish worths” (Boltanski & Thévenot, 2006, p. 133). Tests may lead actors to modify their reports (for example, the critic of managers might come to recognize that they are in fact competent but data-deprived), they may prove inconclusive, and they may recur (production planning may come into contention again, from the same or a different angle) (Boltanski & Thévenot, 2006).

A different form of dispute occurs when some actors claim that the situation at hand either lacks some essential elements for qualifying as a *bona fide* instantiation of the common world that other actors refer to, or that it contains elements that belong to an altogether different common world. In some cases, the claim can be that such conditions pollute the tests on which the reasons of others are based. The way out of the dispute is then to *purify* the situation and conduct a different test with only the appropriate elements (Boltanski & Thévenot, 2006). For example, to decide if production planning is efficient, it may need to be observed without the interference of the sales department on order scheduling.

In other cases the claim can be that, on the practical evidence, the situation pertains to an altogether different common world and a test, if one is needed, should be conducted there (Boltanski & Thévenot, 2006). For example, someone may say that what *really* matters is that the largest clients be served promptly (an argument that mobilizes the “market” or the “domestic” common worlds), not whether production schedules are optimized in the eyes of the engineers (“industrial” common world). This represents “a *clash* between orders of worth” (Boltanski & Thévenot, 2006, p. 134). The way out of a clash is not through tests—different common worlds are not commensurable—but through a *compromise*, which “aims at a common good [*for example, the survival of the company*] that transcends the two different forms of worth in presence by including both of them” (Boltanski & Thévenot, 2006, p. 277). For example, production schedules may be optimized only for orders above a certain size, with smaller orders being dealt with on a ‘best effort’ basis. Compromises are not stable solutions. Because of their inherent ambiguity about what is important, they can easily come under attack if they are examined too closely (Boltanski & Thévenot, 2006).

Not every interaction creates a dispute. People can simply agree, they can seek private “arrangements” (Boltanski & Thévenot, 2006, p. 336), or they can downgrade an issue to a mere contretemps (“relativization”; Boltanski & Thévenot, 2006, p. 339). However, these cases fall outside of proper inquiries and will not be further considered.

Collective Level: Emergence and Environment

Through intersubjective pragmatic exchanges, individual actors can come to modify their reports. A contention may result in actor A accepting the report of actor B after a test (at least in one dimension); a clash may result in a compromise in which both A and B accept one another's reports (in two different dimensions). Differently put, inquiry may result in learning at the individual level.

But justifications (critiques) are supposed to change also what is known at the collective level, where it makes sense to speak of a sense of reality that transcends both individual beliefs and intersubjective communication. To theorize the mechanisms at play, it is necessary to define *collective*, postulate *emergence*, and recognize the effects of the *environment* of inquiries.

Collective Defined

For present purposes, 'collective' will indicate the set of actors participating in an inquiry (the unit of analysis). Actors may be there because of some convention (for example, certain problems are assigned by policy to certain organizational roles, subunits, project teams, task forces, and the like) but participation in inquiry—and, with it, variety in the reasons that are represented in disputes—is an actively contested space: stakeholders—meaning, here, carriers of interests in how inquiry turns out substantively—may attempt to reconfigure it through authority, influence, and the cooptation of interests and institutions (Barros & Michaud, 2020; Dionne et al., 2019; Gond et al., 2016). Consequently, the collectives of inquiry can be fluid, with one short-lived configuration following another.

On the collective level, the relevant properties of information are "configural," meaning that they capture differentiation, patterning, and change in individual properties within the collective (Klein & Kozlowski, 2000, p. 217). Configural properties of an inquiry report set can be observed with time series of measures such as differentiation—in the case of inquiries, how many different unique reports exist, and how different from one another they are—and concentration (for studies that report analogous measures of report sets, see: Miranda et al., 2015; Patriotta et al., 2011).

Measures of differentiation and concentration are theoretically relevant because inquiry is expected to move the collective towards a degree of convergence. The ideal case is terminal consensus: null differentiation and maximal concentration. However, consensus is not guaranteed: it is rarely the case that a single report emerges on the collective level. As a rule, a “judgment” about the situation must be extracted or assembled through means of a “conventional character” (Boltanski & Thévenot, 2006, p. 353), such as majority voting. Different configural properties of the report set can lead stakeholders to invoke different conventions to terminate the inquiry, re-organize it, or re-locate it. For example, lacking a majority (high concentration), the issue at hand may be resolved by authority, passed on to a special committee for further inquiry, ‘kicked up’ or down the hierarchy, or shelved.

Emergence Defined

The mechanism connecting the intersubjective level of disputes and the collective level on which the configural properties of information can be observed is *emergence*. Emergence is defined, for present purposes, as the arising over time of distinct patterns and properties in some phenomenon, interesting for some observer, and depending on the non-orchestrated interactions of multiple elements, provided these can be described in reasonably simple terms; very differentiated and organized systems produce designed, not emergent, outcomes (Chalmers, 2006; Kozlowski et al., 2013; Wilensky & Rand, 2015).

Justification research offers evidence of emergence in studies of endogenously developing collective evaluations (Miranda et al., 2015), practices (Gkeredakis, 2014), and organizational change (Anesa et al., 2024; Demers & Gond, 2020). These studies show that, over time, sequences of justifications and critiques correlate with novel and temporarily stable patterns of information and activity even when orchestration is lacking, incomplete, or contested.

In this paper emergence is theorized limited to the configural properties of an inquiry report set. The emergence of coordination and organizational structure is not implied: as Boltanski & Thévenot suggest (see above) there often exists a gap between inquiry and the resumption of coordinated activity which requires conventional (non-emergence) mechanisms to fill. This limited claim will facilitate the exploration of emergence *per se*, as a process whose characteristics and conditions can represent an autonomous focus of analysis and intervention (Kozlowski et al., 2013).

Environment of Inquiry

As noted above, participation in inquiry is a contested space. By leveraging and manipulating formal and informal organizational factors, stakeholders in a problematic situation can redraw an inquiry's social boundary. From an informational point of view, this has the effect of differentiating the reasons in play, with differentiation due to the actors identifying with and representing various cultural, epistemic, or technical communities and interests (Georgiou, 2018; Huault & Rainelli-Weiss, 2011), as well as to idiosyncratic factors.

Conditions *within* an inquiry's social boundary also matter. Different social structures provide varying affordances for communication. Justification research, for example, shows that different formal organizations can impede or facilitate inquiry (Barros & Michaud, 2020; Reinecke, 2010) and that occasions in which communication intensifies, such as industry forums, are conducive to collective cognitive innovation (McInerney, 2008). As a first approximation, it may be theorized that basic structural characteristics of communication networks including density (the degree to which actors are connected to others), clustering (the degree to which actors communicate within relatively closed cliques; a local analog of density), and centralization (the degree to which relatively few actors dominate communications) modify the possibilities for justifications and critiques, and thus the patterns of information on the collective level.

Moreover, inquiries can be furnished with material, symbolic, or representational devices. Devices add information to inquiries—they carry their own reports—but they can also constrain justifications and critiques by enforcing specific encodings. Thus, technological assemblages (Mercier-Roy & Mailhot, 2019), accounting formats (Chenhall et al., 2013), or visual representations (Bullinger et al., 2023) can materialize and stabilize some evaluative dimensions, but also block out others. Some devices can affect inquiries by realizing feedback loops between the collective and the intersubjective level. For example, a system of public proposals and comments in consultative regulation design appears to facilitate the convergence of actors towards a burgeoning collective consensus (Anesa et al., 2024).

Theoretical Process Model of Inquiry

The conceptual materials presented thus far can be summarized in processual terms, as also shown in Figure 1. Inquiry involves multiple communicating analytical levels. On the individual level, actors use their justification competence to form grammatically sound reasons for specific encodings of a problematic situation. Depending on individual factors of motivation and capacity, they make reasons explicit in the form of public reports. On the intersubjective level, reports are disputed through pragmatic acts like contentions, tests, clashes, test purifications, and compromises. Disputes may cause individuals to change their reports (learn). On the collective level, configural properties of the report set emerge from disputes and change over time. Depending on such properties, inquiry may terminate in a judgment based on the application of some convention, which constructs coordination or structure (on the organizational level, which is kept just outside of the process model scope). Alternatively, inquiry may peter out or be reconstituted in different circumstances. Stakeholders mobilize formal and informal organizational factors to set the environment of inquiry in terms of representation variety, communication affordances, information-adding devices, and collective–intersubjective feedback loops.

INSERT FIGURE 1 ABOUT HERE

Computational Process Model of Inquiry

The next step in this paper's approach is to translate the theoretical process model of inquiry into a computational model. A computational model specifies a theoretical model as an algorithm, makes the theoretical logic explicit and precise, and thus creates the conditions for experimenting and for developing precise propositions (Kozlowski et al., 2013). The computational process model of inquiry is expressed as a procedure, using natural language statements akin to the flow control statements of procedural programming languages: IF-THEN-ELSE, GO TO, and such. Figure 2 provides a visual summary. (The detailed computational model is available as supplemental material.)

INSERT FIGURE 2 ABOUT HERE

The first model component— 'Set up inquiry' in Figure 2—corresponds to stakeholder actions on the environment of inquiries: influencing representation variety, establishing communication networks, introducing devices (optionally), and creating feedback loops (optionally). The relevant procedural steps are written for an ideal observer of the inquiry process. The ideal observer is interested in the dynamics of inquiry under different conditions, but not necessarily in substantive outcomes. Consequently, the issue at hand is not defined: It is simply assumed that substantively interested actors (inquiry participants and stakeholders) would know what it is, and substantively disinterested observers would focus on the process of inquiry and its emergent information patterns, not on meanings.

The second component— 'Run inquiry' —is also written for an ideal observer. It makes explicit certain conceptual and methodological assumptions for the collective level of the process. One, inquiry is open-ended (Boltanski & Thévenot, 2006), which means that the observer does not set a precise goal for it (unlike, for example, in problem-solving). For example, participants are not required to reach a consensus, or even form a majoritarian view. Two, inquiries are relatively short-lived, consistent with the short temporality of analysis in justification theory (Dodier, 1993). Thus, in computational terms, the inquiry runs while there are participants possessing enough energy to dispute, and energy is not replenished; the other possibility (not represented in Figure 2) is that the observer arbitrarily terminates the inquiry early.

The third component— 'Dispute' — is written not for the ideal observer but for 'disputants' (the participants in an inquiry). It describes the intersubjective level of inquiry: what all disputants are 'asked' (by the observer) to do once the environment of inquiry is set up. Intersubjective behaviors are constrained by environmental conditions (for example, how many neighbors in the network a disputant has and how different from each other are their respective reports), but they are not orchestrated: They occur probabilistically. Their outcomes are also probabilistic: for example, a test has a 50 percent chance of being inconclusive, and a 25 percent chance of being 'won' by either disputant; a clash goes unresolved 80 percent of the times (other details are available in the detailed computational model).

Finally, the fourth component— 'Disputant variables' — specifies the individual level of the theoretical process model, not as a procedure but as random variables pertaining to individual disputants, which procedurally specified intersubjective behaviors can probabilistically alter. Such variables stand in for the cognitive, motivational, and capacity properties of real-life participants: multidimensional, encoded, and assumedly grammatical reasons; a propensity to act in inquiry; and a quantity of energy to do so.

Methods

The computational model is instantiated as an agent-based model, a type of computer simulation suitable for the study of phenomena emerging from the interactions of multiple 'agents' such as disputants (Fioretti, 2013; Wall, 2016; Wilensky & Rand, 2015). Agent-based models facilitate data-intensive experimentation: It is straightforward to vary the initial state of the simulated system in terms of environmental conditions and agent properties and to observe emergent patterns. The agent-based model is implemented in NetLogo 6.2.2 (Wilensky, 1999), a specialized software natively providing much of the functionality for defining agents, connecting them in networks, making them interact, controlling the simulation process, and capturing quantitative results. This allows the implementation to be focused on the computational model's specifics and on data capture via the software's interface, reducing the coding workload, the scope for programming errors, and the need for software testing.

Different experiments were performed with an explorative intent; in this sense, the approach was one of open-ended 'experimentation.' The experimental units were batches of 300 model runs with the same parameter set, each run lasting for 1,000 time increments (which ensured that runs were terminated before most disputants ran out of energy). Treatments were constituted by different parameter sets. Observational units (reported in results) are represented by time series data for each treatment, averaged across the corresponding 300 runs.

To generate baseline results, an initial nine-treatment experiment was performed, varying the values of the environmental conditions of representation variety (two, five, or ten initial reports randomly distributed among disputants, each report with six dimensions encoded with a random value between −9 and 9, 0 indicating a null or unused dimension) and network type (three 'ideal' types with extreme density, clustering, or centralization), resulting in a 3×3 matrix. Other parameters including number of disputants (50), average number of non-null report dimensions (only three, to ensure scope for compromises on other dimensions), minimum and maximum individual energy, minimum individual propensity to act, and the unit energy costs of behaviors were kept constant across all treatments. A second experiment was performed with the same 3×3 treatment structure, but using alternative network types that, although based on theoretical models, provided values of density, clustering, and centralization assumedly closer to those of empirically observable social networks. (Specifics for all network types are available as supplemental material.)

One treatment from the second experiment was replicated introducing two different "shocks" (Kozlowski et al., 2013). First, a device was activated. Treatments were represented by two different device weights (making the device differently relevant for disputants) crossed with three different values for non-null dimensions (making the device differently specialized on few report dimensions), resulting in a 2×3 matrix. Then, a zeitgeist was activated, running two treatments with low or high zeitgeist weight (relevance for disputants).

For a sense of data volumes: For the four metrics reported in results—number of unique reports, differentiation, concentration, and drift (how many encodings, on average, change in individual reports relative to their initial values; an average measure of learning on the individual level)—each of the 26 reported treatments generated 1.2 million data points. After averaging across runs, 4,000 data points were reported for each observational unit.

Results

Convergent Patterns

Baseline results—the first two experiments of nine treatments each—are presented in Figure 3A and 3B. All observational units show the same dynamic: initially pronounced changes (in the very first few time increments) and a rapid stabilization thereafter. Differently put, inquiry appears to result in a consistent general pattern whatever the environmental conditions.

INSERT FIGURE 3A AND 3B ABOUT HERE

More precisely, every treatment sees an initial information explosion: the number of unique reports existing among disputants shoots up approximately four-fold. The explosion, however, is short-lived: unique reports first drop, although less rapidly than on the way up, and then stabilize. Intuitively, this can be explained as follows. Suppose A and B have the same report, and C and D both have another report. If A and C dispute, and B and D dispute, they might end up with four different reports among them, up from two. Disputant A might now report more like C and less like B, and D more like B and less like C. The effect is multiplied over many disputes. However, with a restricted number of dimensions, possible encodings, and behaviors, the potential for new reports is limited. Moreover, tests, clashes, and compromises exert a strong pull towards convergence. When a pair of reports is disputed, individual encodings can probabilistically stay as they are or become identical; the entire reports stay as they are or become more similar. On the collective level, this creates a dynamic of recombination and redistribution, rather than radical novelty and divergence. Even at the beginning, when unique reports proliferate, differences among them diminish *on average*: the differentiation metric, which measures the average number of different encodings between all pairs of unique reports, follows a steady downward path before stabilizing. At the same time, drift steadily increases before stabilizing: for differentiation to diminish on the collective level, reports need to change, on average, on the individual level.

Widespread alignment, however, is elusive. Concentration—the degree to which few reports dominate among disputants, measured as a Gini coefficient—never becomes maximal (the level at which all disputants share the same report). If anything, it appears to tend to something like a ‘natural’ middling level. Initially, concentration is random (it depends on the random distribution of initial reports). If it starts out high, then it rapidly diminishes, because dominant reports are those more likely to be differentiated away by disputes. If concentration starts out low, then it can rapidly increase, because any of the approximately equally distributed initial reports may temporarily capture a relatively large ‘share of mind’ among disputants. These initial jumps, however, are soon reabsorbed.

The general pattern is broadly consistent with justification theory: inquiry leads towards a partial convergence, as differentiation diminishes without disappearing. In the process, participants accept and reject information and learn new justified beliefs.

Workload and Communication Affordances

Reading Figure 3A and 3B by rows, the effects of representation variety can be examined independently from network type. In general, the broader the representation, the greater the initial re-combinative explosion (in absolute terms): there are more possibilities to shuffle encodings around. However, there is little effect on convergence overall. When the initial re-combinative explosion is reabsorbed, in the case of both narrow and medium representation disputants end up with only slightly more unique reports than they started out with and in the case of broad representation with slightly fewer. Differentiation increases only marginally going from narrow to broad representation. Nonetheless, there is an effect on drift, which shifts higher with broader representation. In other terms, regardless of the diversity among their reports at the beginning of the inquiry, disputants end up converging to similar degrees. To get there, however, if representation is broader, they must learn more; in other terms, their workload is greater. (To generate more drift, agent activity and energy expenditure, not reported for reasons of space, increase going from narrow to broad representation.)

Reading Figure 3A and 3B by columns, the effects of network type can be examined independently from representation variety. In Figure 3A, convergence is more pronounced—concentration is higher, unique reports are fewer, differentiation is marginally lower—with dense and clustered (full) or centralized (star) networks, compared with 'barely there' networks that are both sparse and decentralized (ring). In Figure 3B, the same effect appears—although dampened— when comparing less extremely dense (small world) or centralized (preferential attachment) networks to networks that are relatively sparse, decentralized, and clustered (connected caveman). In other terms, both density and centralization go with greater convergence.

However, there appears to be an interaction between representation variety and network structure. The effects of network density and centralization on convergence become more noticeable when representation is broader: once the inquiry stabilizes, concentration is higher, and differentiation is lower. It appears that disputants do not learn more in dense or centralized networks—the levels of drift barely budge across network types—but they learn more quickly: curves are steeper. (Metrics of agent activity also show that more energy is expended more quickly.) An intuitive explanation is that dense or centralized networks provide better communication affordances which allow disputants to go through the dispute workload more efficiently: in dense networks, every disputants has many neighbors, while in centralized networks, central disputants function as information interchanges for many peripheral disputants. This, however, makes a difference only if the workload is heavy enough. When the workload is modest, bandwidth matters less. (Networks as implemented in the model carry communication, not influence or control. In centralized networks, central disputants are as susceptible to learning from interaction as peripheral disputants. They dispute more often but their reports do not dominate.)

Adding Information and Meta-Information

A device brings into an inquiry its own report. In the agent-based model, the device is implemented as an agent with a fixed report, which all disputants can interrogate, but no learning behaviors. The device's report is uncorrelated with those of disputants: it adds information to the mix (for example, participants in an inquiry may be asked to consider an independent consulting report interpreting the issue at hand in a distinctive way). The device operates by biasing disputes in favor of disputants that are already aligned to it; it is as if a disputant could refer to the device's encodings to add weight to justifications and critiques (for example, the weight of a consulting report may depend on whether it is sanctioned by the board of directors). Thus, two variables come into play: How much information the device carries, and what weight the information has. (A device whose report were *correlated* to that of some disputants might similarly make them more influential without, however, adding information. Because the focus here is on information differentials, not social influence, the possibility is not explored.)

Figure 4 shows the results of introducing a device. The point of reference is one of the baseline treatments (from the second set of nine). This was replicated introducing a device with six different treatments. In half of them, the device had a low weight. In the other half, it had maximal weight, meaning that if one disputant was aligned to it and the other was not, the first disputant always won the dispute. The device weight variable was crossed with an information quantity variable: the device's report could carry non-null positive values in one dimension, three, or six, and null values in others.

INSERT FIGURE 4 ABOUT HERE

With a low weight, the device has a negligible effect regardless of how much information it carries. With a high weight, the effect is remarkably evident—but only if the device carries little information. In that case, the effect of the device is that the inquiry yields *less* convergence relative to the baseline: the number of unique reports and differentiation are up, drift is down. When the device's report carries values in all dimensions, the effect is again negligible.

This may be explained as follows. If the device has weight, it has it on both what it encodes and what it ignores. Non-null encodings dominate tests and clashes, resulting in early settlements; null encodings fortify aligned disputants (those that also carry null encodings) into not yielding to compromise. (Agent activity metrics indicate that with a high device weight, disputants perform less than 20 percent of the tests than with a low weight and attempt to compromise nine times as often.) In other terms, a weighty, specialized device creates a low-learning situation. The effect is coherent with studies of evaluation systems in social platforms (Barbe & Hussler, 2019) and formal contracts in university-industry partnerships (Mesny & Mailhot, 2007). The opposite of a dimensionally focused device is an ambiguous one (Boltanski & Thévenot, 2006) such as a multidimensional performance measurement system (Chenhall et al., 2013). An ambiguous device signals that many dimensions are in play, without being particularly effective in enforcing any of them (it helps only those disputants that are already aligned to it). It neither prevents nor stimulates learning.

Baseline experiments were run under the assumption that disputants could only know their immediate neighbors' reports. A zeitgeist (meaning 'spirit of the time;' used jocularly) approximates instead the condition in which information is fed back from the collective level to all disputants: it lets disputants know how the majority, neighbors and non-neighbors, report. Any individual report acquires weight if it is aligned with the majority report (on individual encodings). The zeitgeist is implemented as an agent with a report, like a device; unlike a device, its report may change at each time increment, reflecting the evolving majority report.

Figure 5 shows the results of introducing a zeitgeist relative to the same baseline treatment as for the device experiment. The zeitgeist was given a low weight (little influence on disputes) or a maximal weight (strong influence). With a low weight, the zeitgeist leads to greater convergence, as would be expected: the number of unique reports is lower, differentiation almost disappears (below 1), and even concentration inches up. Curves, moreover, are steeper. But with a maximal weight, the effect on convergence all but disappears and even reverses: differentiation and the number of unique reports increase slightly, and concentration inches down. Crucially, drift drops. In this case, too, curves are steeper.

INSERT FIGURE 5 ABOUT HERE

This may be interpreted as follows. With a low weight, the zeitgeist gives a boost to a naturally convergent process. The zeitgeist has a higher probability than a device to kick in, because it is more likely that a disputant is already aligned to the majority report, and increasingly so as time passes. Thus, unlike a device, a zeitgeist is effective even with a low weight. With maximal weight, the same dynamic as for a maximal-weight device applies (only, with greater probability): the zeitgeist becomes hegemonic on some dimensions and makes compromises difficult on others. Differently put, adding to an inquiry meta-information—that is, information that is not about the issue at hand, but about how the issue is being encoded on the collective level—appears to facilitate convergence among disputants if the disposition to conform to the collective is mild. This seems to chime with a study (Anesa et al., 2024) that detects alignment to a burgeoning consensus around a *voluntary* tax compliance code. If, however, disputants are strongly disposed to conform, the net result is again something of a low-learning situation. This might be what happens in organizations and institutions where a dominant normative logic is enforced (Boivin & Roch, 2006; Munzer, 2019).

Discussion

Simulation results suggest that the computational model and its agent-based instantiation are reasonably consistent with justification theory and research. This provides a degree of model validation, based on which some specific propositions can be preliminarily formulated: a) Inquiries consistently follow a two-phase path (re-combinative explosion–reabsorption) overlaid on a steady trend towards (partial) convergence; b) both network density and centralization favor convergence; c) broader representation reinforces the convergence effects of network density and centralization; d) an effectively imposed low-information device is antagonistic to convergence; e) a collective–intersubjective feedback loop promotes convergence if expectations of conformity are low, and is antagonistic otherwise. These propositions could be recast as hypotheses and tested through experimental and correlational research, thus closing the theory-building loop with empirical verification (Kozlowski et al., 2013).

Some limitations of the approach as implemented thus far are evident. First, justification theory and research have been put through a multi-step translation, involving concept selection and simplification. To mitigate the risk of conceptual distortions, the mechanics of the computational model have been made as visible as possible (including in supplemental material). Second, at this stage, the results on which the above propositions depend are preliminary. Particularly, sensitivity analyses are required to identify boundary conditions. That work is ongoing.

Other limitations are theoretical, rather than methodological. They imply possibilities for expanding research and theory on organizational justification in novel directions: social networks, psychology, and behavior. In the first place, the networks considered thus far are oversimplified: they only transmit communications and are static. The model could be developed to account for social network features such as the transmission of control, influence, and trust, and spontaneous short term dynamics of network structure (Easley & Kleinberg, 2010; Freeman, 1978), which may alter the dynamics of convergence. Moreover, network structure and representation variety are treated as uncorrelated factors, whereas in real-life inquiries the members of an epistemic or technical community may tend to cluster.

These examples suggest that both model and experiments could be enriched by mobilizing the considerable conceptual toolkit of social network analysis.

In the second place, the model's parameterization is conjectural, which is partly due to a scarcity of empirical evidence to support model calibration. For example, the probabilities of different outcomes in tests, clashes, and compromises are arbitrary, although broadly plausible. The same applies to other parameters, such as network size. Model calibration should be grounded in empirical observation, creating a virtuous loop between observation and model refinement (Kozlowski et al., 2013).

In both the individual and intersubjective components of the model, parameters and experimental variables are replaced by random variables. However, individual motivation and capacity may be systematically correlated with local culture, socio-demographic factors, or status. Stakeholders may select and coopt participants based on perceived motivation and capacity and strategically distribute them in networks (for example, in central positions). Network structures and dynamics might affect motivation and capacity themselves: for example, participants might be differently active in, say, hierarchical or 'freewheeling' contexts. Although they are recognized in justification theory (Boltanski & Thévenot, 1999), the psychological factors of inquiries, particularly in organized contexts, are currently not sufficiently conceptualized and researched to fit into a computational model.

On the intersubjective level of the model, disputants act probabilistically and, moreover, they have no strategy. The model assumes—with justification theory—that participants in inquiry are seriously disposed to agreeing: "Interruption of the action in a crisis is acceptable only if the actors manifest good will in the search for convergence" (Boltanski & Thévenot, 2006, p. 351). This is not a prescription, but simply part of the definition of justification: if the actors in inquiry do not intend to converge, then they are not engaging in justification at all but in some other kind of performance. Yet, this may happen often. Research shows that inquiries can be ritualistic (Islam et al., 2019) and can be used for strategic purposes (Demers & Gond, 2020; Gond et al., 2024). Actors in inquiries might adopt detachment, non-cooperation, and disruption as behavioral strategies, with relevant consequences for convergence and learning. Like for psychological factors, further conceptualization and research are required before behavioral strategies can be meaningfully incorporated in a computational model.

Conclusions

Preliminary results from the model presented in this paper suggest that the collective outcomes of justification could correlate with measures of representation variety, network structure, and added information and meta-information in inquiries. Research is required to calibrate the model and test the preliminary results through quantitative studies. Quantitative research on justification in organizations is relatively rare, but it represents a necessary step for improving the understanding of inquiry as a contested process and operationalizing the results of prior theorizing. On the other hand, social network, psychological, and behavioral factors of inquiry and justification in organizations are not yet sufficiently well studied to enter the same treatment of computational modeling and empirical research; interpretive theory building is required. Inquiries are configurationally complex processes, with interacting factors on the individual, intersubjective, collective, and ultimately organizational levels of analysis. Capturing and managing such complexity demands a multi-pronged approach in disciplinary and methodological terms.

References

Anesa, M., Spee, A. P., Gillespie, N., & Petani, F. J. (2024). Reassessing moral legitimacy in times of instability. *Journal of Management Studies*, *61*(3), 857–887. https://doi.org/10.1111/joms.12889

Barbe, A.-S., & Hussler, C. (2019). “The war of the worlds won’t occur”: Decentralized evaluation systems and orders of worth in market organizations of the sharing economy. *Technological Forecasting and Social Change*, *143*, 64–75. https://doi.org/10.1016/j.techfore.2019.02.011

Barros, M., & Michaud, V. (2020). Worlds, words, and spaces of resistance: Democracy and social media in consumer co-ops. *Organization*, *27*(4), 578–612. https://doi.org/10.1177/1350508419831901

Boivin, C., & Roch, J. (2006). Dominant organizational logic as an impediment to collaboration. *Management Decision*, *44*(3), 409–422. https://doi.org/10.1108/00251740610656287

Boltanski, L. (2012). *Love and Justice as competences: Three essays on the sociology of action*. Polity. (Original work published 1990).

Boltanski, L., & Thévenot, L. (1999). The sociology of critical capacity. *European Journal of Social Theory*, *2*(3), 359–377. https://doi.org/10.1177/136843199002003010

Boltanski, L., & Thévenot, L. (2006). *On justification: Economies of worth* (C. Porter, Trans.). Princeton University Press. (Original work published 1991).

Bullinger, B., Schneider, A., & Gond, J.-P. (2023). Destigmatization through visualization: Striving to redefine refugee workers’ worth. *Organization Studies*, *44*(5), 739–763. https://doi.org/10.1177/01708406221116597

Chalmers, D. J. (2006). Strong and weak emergence. In P. Clayton & P. Davies (Eds.), *The re-emergence of emergence: The emergentists hypothesis from science to religion* (pp. 244–256). Oxford University Press.

Chenhall, R. H., Hall, M., & Smith, D. (2013). Performance measurement, modes of evaluation and the development of compromising accounts. *Accounting, Organizations and Society*, *38*(4), 268–287. https://doi.org/10.1016/j.aos.2013.06.002

Cloutier, C., Desjardins, F., & Rouleau, L. (2024). Grand challenges viewed through the pragmatist lens of the economies of worth: A multidisciplinary review and framework for the conduct of moral work in pluralistic settings. *Journal of*

Management Studies. https://doi.org/10.1111/joms.13078

Demers, C., & Gond, J.-P. (2020). The moral microfoundations of institutional complexity: Sustainability implementation as compromise-making at an oil sands company. *Organization Studies*, *41*(4), 563–586. https://doi.org/10.1177/0170840619867721

Dionne, K.-E., Mailhot, C., & Langley, A. (2019). Modeling the evaluation process in a public controversy. *Organization Studies*, *40*(5), 651–679. https://doi.org/10.1177/0170840617747918

Dodier, N. (1993). Action as a combination of “common worlds.” *Sociological Review*, *41*(3), 556–571. https://doi.org/10.1111/j.1467-954X.1993.tb00077.x

Easley, D., & Kleinberg, J. (2010). *Networks, crowds, and markets*. Cambridge University Press. https://doi.org/10.1017/CBO9780511761942

Fioretti, G. (2013). Agent-based simulation models in organization science. *Organizational Research Methods*, *16*(2), 227–242. https://doi.org/10.1177/1094428112470006

Georgiou, O. (2018). The worth of fair value accounting: Dissonance between users and standard setters. *Contemporary Accounting Research*, *35*(3), 1297–1331. https://doi.org/10.1111/1911-3846.12342

Gkeredakis, E. (2014). The constitutive role of conventions in accomplishing coordination: Insights from a complex contract award project. *Organization Studies*, *35*(10), 1473–1505. https://doi.org/10.1177/0170840614539309

Gond, J.-P., Barin Cruz, L., Raufflet, E., & Charron, M. (2016). To frack or not to frack? The interaction of justification and power in a sustainability controversy. *Journal of Management Studies*, *53*(3), 330–363. https://doi.org/10.1111/joms.12166

Gond, J.-P., Leca, B., Cloutier, C., & Grattarola, A. (2024). An economies-of-worth perspective on strategy as practice: Dealing with strategic pluralism through legitimation, localization, and materialization. In D. Golsorkhi, L. Rouleau, D. Seidl, & E. Vaara (Eds.), *The Cambridge handbook of strategy as practice* (3rd ed.), forthcoming. Cambridge University Press.

Grattarola, A., Gond, J.-P., & Haefliger, S. (2024). *Traduttore, traditore*? Gains and losses from the translation of the economies of worth. *International Journal of Management Reviews*, *26*(1), 137–159. https://doi.org/10.1111/ijmr.12344

Huault, I., & Rainelli-Weiss, H. (2011). A market for weather risk? Conflicting metrics, attempts at compromise, and limits to commensuration. *Organization Studies*, *32*(10), 1395–1419. https://doi.org/10.1177/0170840611421251

Islam, G., Rüling, C.-C., & Schüßler, E. (2019). Rituals of critique and institutional maintenance at the United Nations Climate Change Summits. *Research in the Sociology of Organizations*, *65B*, 23–40. https://doi.org/10.1108/S0733-558X2019000065B004

Klein, K. J., & Kozlowski, S. W. J. (2000). From micro to meso: Critical steps in conceptualizing and conducting multilevel research. *Organizational Research Methods*, *3*(3), 211–236. https://doi.org/10.1177/109442810033001

Kozlowski, S. W. J., Chao, G. T., Grand, J. A., Braun, M. T., & Kuljanin, G. (2013). Advancing multilevel research design. *Organizational Research Methods*, *16*(4), 581–615. https://doi.org/10.1177/1094428113493119

McInerney, P. (2008). Showdown at Kykuit: Field-configuring events as loci for conventionalizing accounts. *Journal of Management Studies*, *45*(6), 1089–1116. https://doi.org/10.1111/j.1467-6486.2008.00784.x

Mercier, H., & Sperber, D. (2017). *The enigma of reason: A new theory of human understanding*. Penguin Books.

Mercier-Roy, M., & Mailhot, C. (2019). What's in an app? Investigating the moral struggles behind a sharing economy device. *Journal of Business Ethics*, *159*(4), 977–996. https://doi.org/10.1007/s10551-019-04207-7

Mesny, A., & Mailhot, C. (2007). The difficult search for compromises in a Canadian industry/university research partnership. *Canadian Journal of Sociology-Cahiers Canadiens de Sociologie*, *32*(2), 203–226. https://doi.org/10.2307/20460632

Miranda, S. M., Kim, I., & Summers, J. D. (2015). Jamming with social media: How cognitive structuring of organizing vision facets affects IT innovation diffusion. *MIS Quarterly*, *39*(3), 591–614. https://doi.org/10.25300/MISQ/2015/39.3.04

Munzer, M. (2019). Justifying the logic of regulatory post-crisis decision-making: The case of the French structural banking reform. *Critical Perspectives on Accounting*, *60*, 44–64. https://doi.org/10.1016/j.cpa.2018.08.001

Patriotta, G., Gond, J.-P., & Schultz, F. (2011). Maintaining legitimacy: Controversies, orders of worth, and public justifications. *Journal of Management Studies*, *48*(8), 1804–1836. https://doi.org/10.1111/j.1467-6486.2010.00990.x

Reinecke, J. (2010). Beyond a subjective theory of value and towards a `fair price': An organizational perspective on Fairtrade minimum price setting. *Organization*, *17*(5), 563–581. https://doi.org/http://dx.doi.org/10.1177/1350508410372622

Susen, S. (2017). Remarks on the nature of justification: A socio-pragmatic perspective. *Research in the Sociology of Organizations*, *52*, 349–381. https://doi.org/10.1108/S0733-558X20170000052010

Wall, F. (2016). Agent-based modeling in managerial science: An illustrative survey and study. *Review of Managerial Science*, *10*(1), 135–193. https://doi.org/10.1007/s11846-014-0139-3

Wilensky, U. (1999). *NetLogo. http.//ccl.northwestern.edu/netlogo/*. Center for Connected Learning and Computer-Based Modeling, Northwestern University.

Wilensky, U., & Rand, W. (2015). *An introduction to agent-based modeling: Modeling natural, social, and engineered complex systems with NetLogo*. The MIT Press.

Figure 1

Theoretical Process Model of Inquiry

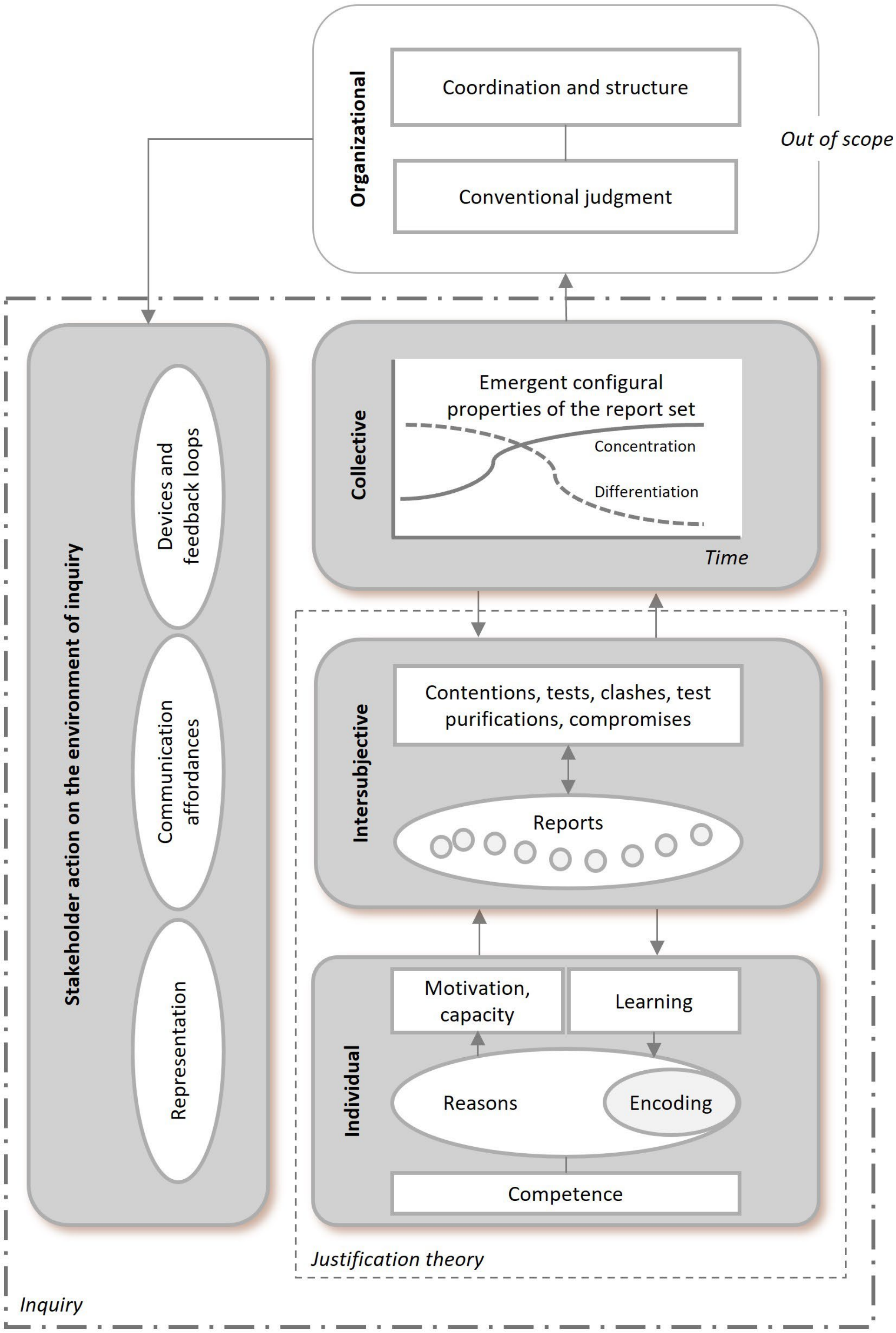

Figure 2

Computational Process Model of Inquiry

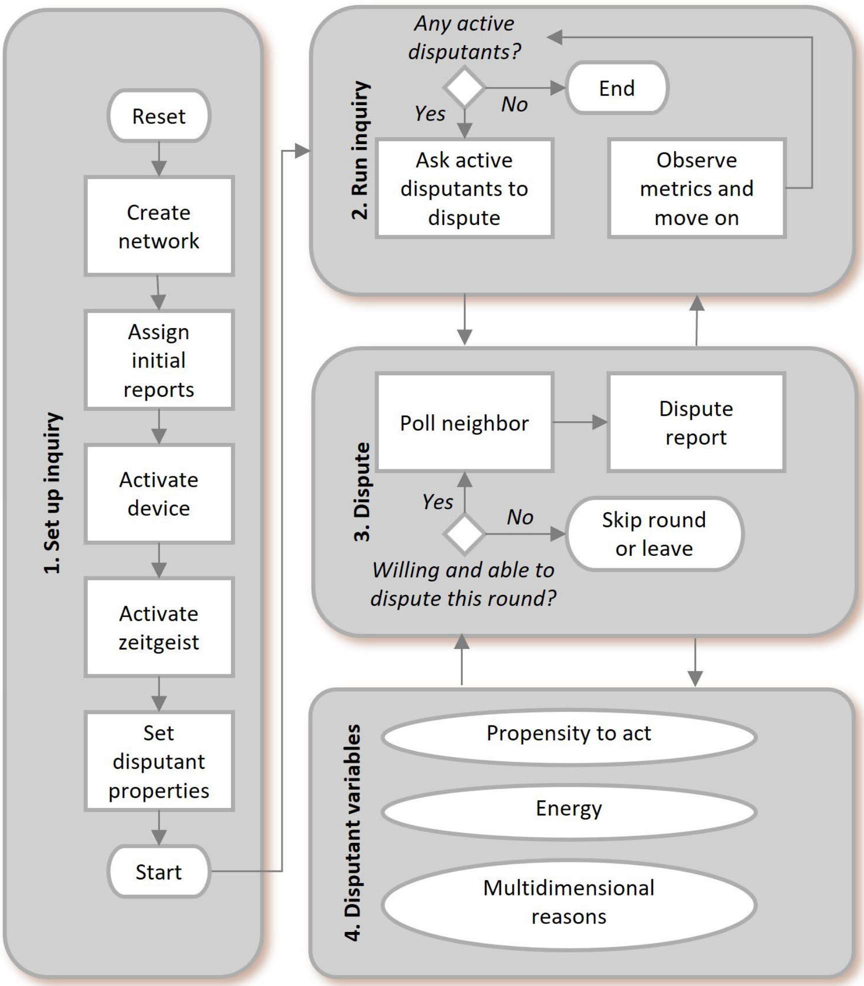

Figure 3A

Baseline experiment

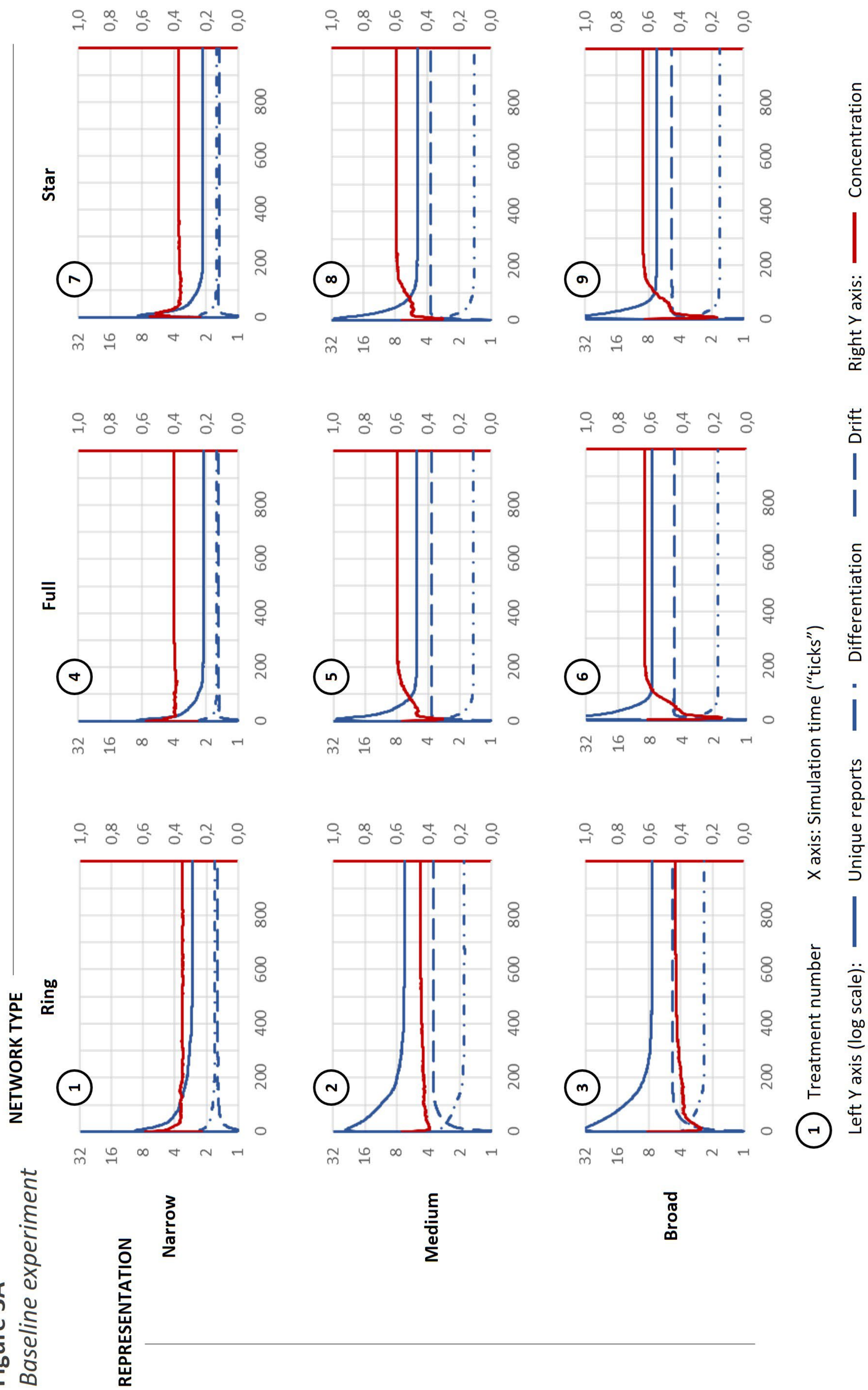

Figure 3B
Baseline experiment

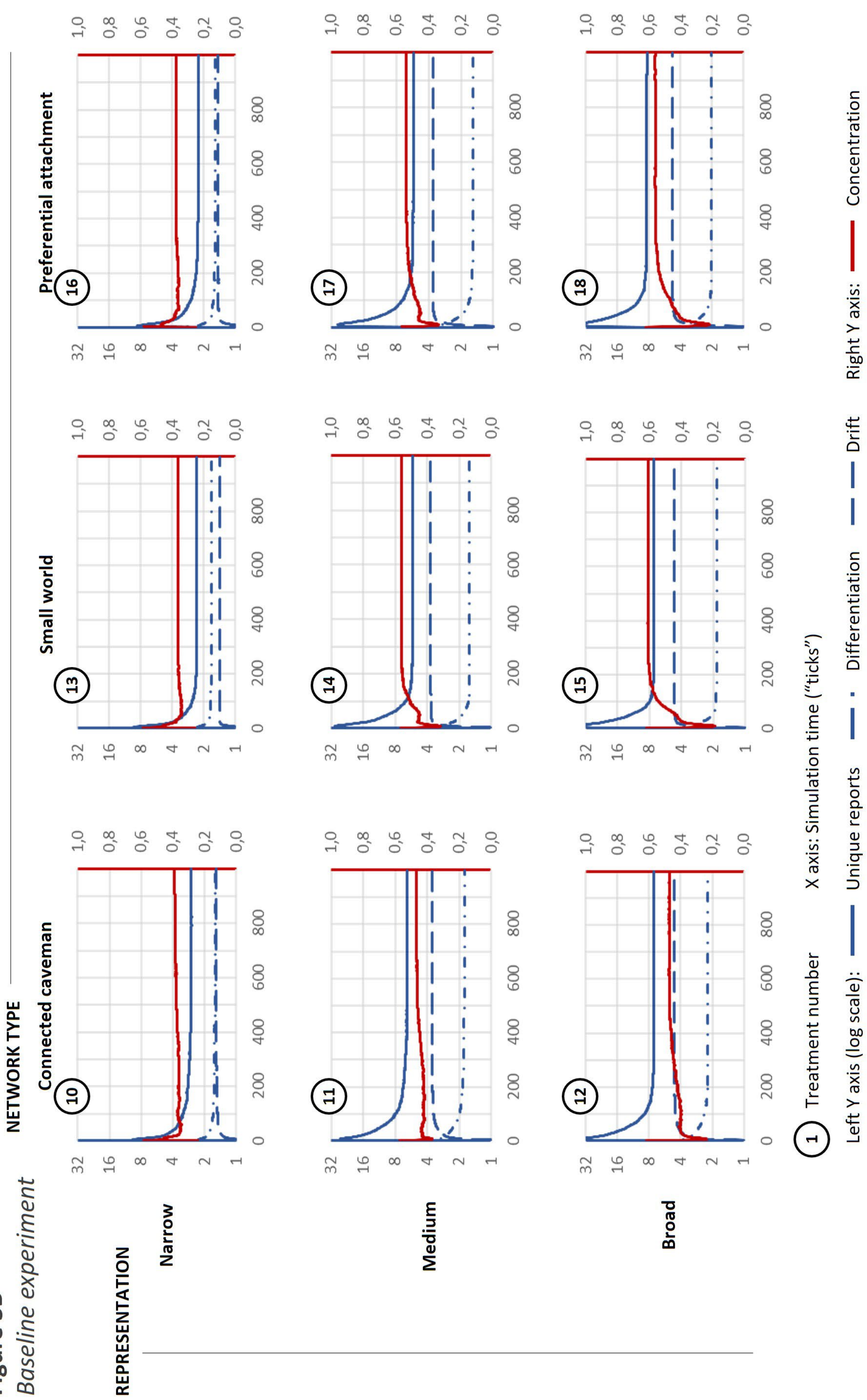

Figure 4

Device Effects

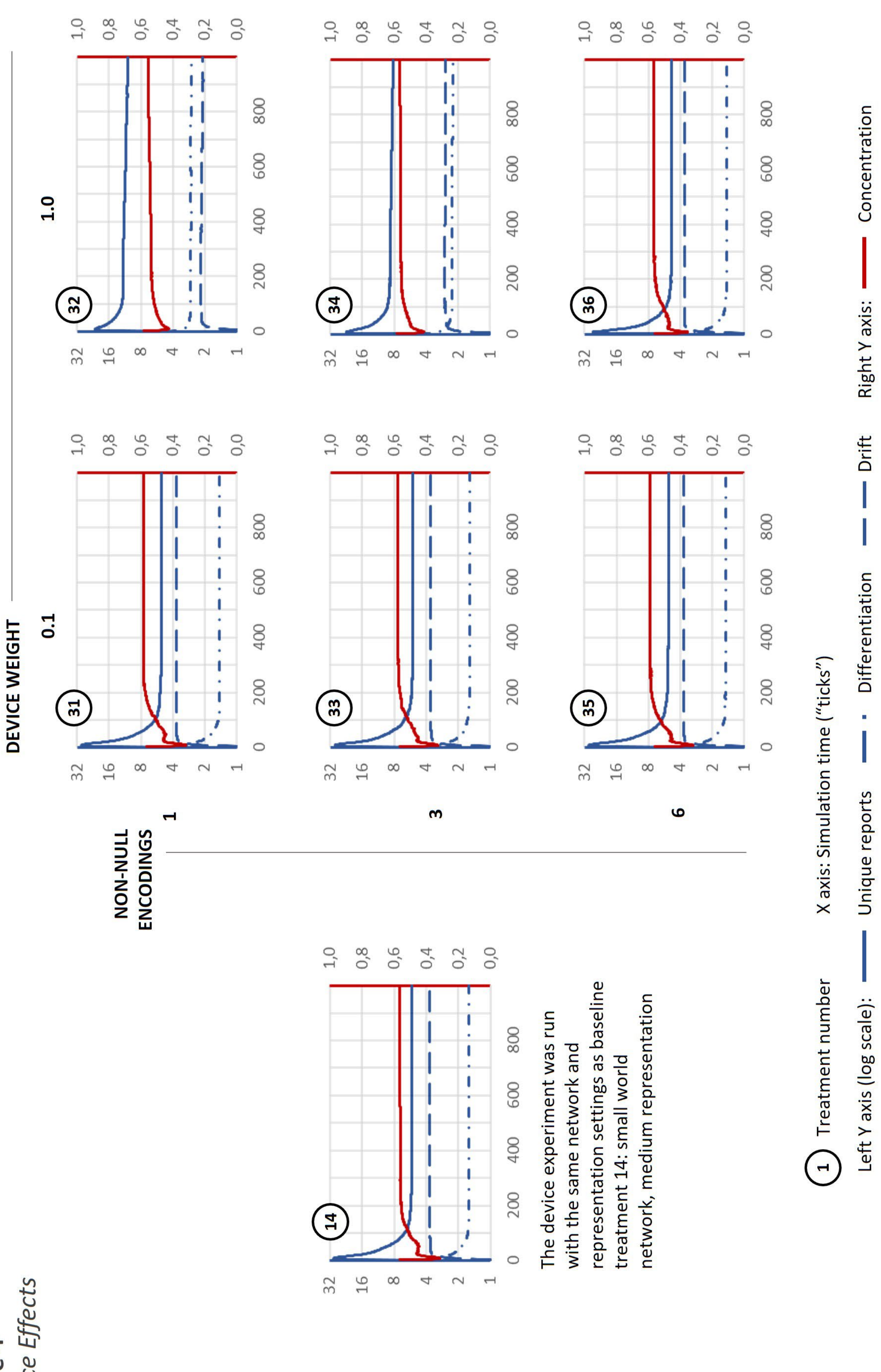

Figure 5
Zeitgeist Effects