For a situational analytics: An interpretative methodology for the study of situations in computational settings

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Abstract:	This paper introduces an interpretative approach to the analysis of situations in computational settings called situational analytics. I outline the methodological and theoretical underpinnings of this approach, which is still under development, and discuss its operationalization in a semi-automated study of a computationally-inflected social phenomenon, intelligent vehicle test videos on Youtube. Situational analytics extends a qualitative methodology for data analysis developed by Science and Technology Studies scholar Adele Clarke, Situational Analysis (2005), which deploys cartographic methods to visualise and analyse situations observed in ethnographic settings. Its contemporary relevance, I propose, derives from its ability to render tractable a methodological problem that arises in computational social science. As sociologists have shown, contemporary social life has not remained unaffected by the computational architectures in which it increasingly unfolds. However, computational social science tends to be defined as an observational science, and this obliges it to assume, on methodological grounds, that the computational architectures for data capture and analysis on which it relies do not fundamentally affect phenomena studied by these means. Situational Analytics offers a way to address this problematic, namely by making 'the situation' the unit of empiricist computational analysis. The paper discusses how this approach deviates from some of the analytic frameworks for situational analysis recently taken up in computational social science, and concludes by discussing how Clarke's situational analysis needs to be further elaborated to enable us to elucidate contemporary transformations of the situational fabric of social life with the aid of computational research methods.

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1. Introduction

It has been argued that digital data and computational tools enable the extension of formal, automat-able approaches in data analysis to contextual phenomena. The newfound capacity of formal analysis to take ephemeral, tacit, ambient and latent aspects of social life into account, is often said to derive from the adoption of sophisticated computational methods such as machine learning, and their application to new types of social data made available by digital architectures in society (Cointet, 2018; Castelle, 2019). To give a popular example, digital listening services are assumed to be capable of situational analysis, able to pick a suitable song for 'your ride home after work' based on locative analysis of aggregate collective user choices," therebye taking listening contexts into account, as Seaver mentions in his 2015 article "The Nice Thing About Context Is That Everyone Has It." Computational scientists' claim to knowing social contexts puts adherents of interpretative approaches in social enquiry in an uneasy position, as the capacity to grasp contextual phenomena - latency, situatedness, atmosphere, and so on - tends to be regarded as the distinguishing feature of the latter approaches, and what validates their contribution to knowledge. In this article, I review claims by proponents of computational social science to have rendered context amendable to formal analysis, and argue that we should not take this methodological narrative at face value. If we are to reclaim a rightful role for interpretative enquiry in a changing methodological landscape defined by computational innovation, we should neither denounce nor affirm the newfound analytical capacities of computational science, but instead engage in critical reconstruction of intepretative methodology : to be sure, computational social science's claim to have rendered contextual phenomena amendable to systematic, formal analysis may be overblown, but if interpretative approaches in digital social research are to reclaim their distinctive capacity for contextual understanding, reconsideration of some long-held assumptions of our own will be required.

To really understand the limitations - and possibilities - of the computational analysis of social life, I believe we must be willing to accept a counter-intuitive diagnosis: computational social science's problem with context does *not* derive from a *shortage* of commitment to elucidating the situated, local and embodied character of social life in this field, but arises

because their commitment to this analytic purpose is *too unwavering, too rigid, and too narrowly defined*. The formal approach to data analysis required by automation leaves computational researchers ill-equipped to perceive, let alone come to terms with, a crucial transformation of our time: what counts as "context" appears to be undergoing transformation in a digital society. New computational architectures, such as social media platforms, have rendered social life reportable, interpretable, shareable and influenceable in potentially new ways. And as a result of the expansion of these architectures across society, social activities are becoming more formatted, thinly structured, and artificial (Aliamo & Kallinikos, 2018). As I will discuss in what follows, the very same digital transformations that have made available new types of social data, and enabled the application of new computational methods in social research, are equally affecting the role of locatedness, embodiement, latency, atmosphere, and so on in social life - in short, its contextual character.

Computational social scientists are certainly not unaware of the methodological challenges that digital data architectures pose to the quality and robustness of analyses that derive data from them. In a recent introduction to the field, Salganik notes that “the digital systems that record behavior are highly engineered to induce specific behaviours” (Salganik, 2019; p. 35). However, he like other computational social scientists, defines the computational approach to knowing society as an *observational science* (Salganik, 2019; see also Voigt et al, 2017; Lazer et al, 2009). This obliges him and other computational social scientists to assume, *on methodological grounds*, that societal architectures for data capture and analysis do not fundamentally inflect or inform *the phenomena under study,* or at the very least, that such effects are containable: digital architectures may ‘distort’ social phenomenona that unfold within them but cannot be assumed to positively inform their organisation. To be sure, the idea that the apparatus of knowledge should not contaminate the phenomenon under study, and to negatively define phenomena thus affected as 'experimental artefacts' (Rheinberger, 1997), is one generally held and respected across the sciences. However, in pursueing this methodological tenet uncritically in the particular case of knowing society by digital means, the effect is to significantly limit the ability of computational social science to engage empirically, let alone normatively, with digital transformations of social life.

The aim of this article, then, is to offer methodological reflections on how this challenge can be rendered tractable in computational social research, and to clarify the crucial contribution that interpretative methodology can make to elucidating contextual phenomena in a

computational age. To do this, I draw on recent work in the sociology of science and technology. Following Knorr-Cetina (2014), I propose that it is the *situational framing* of social life that is fundamentally affected by digital transformations. Following Clarke (2005), I propose this transformation can be addressed by interpetative approaches to social data analysis, by adopting an empiricist, cartographic approach to computational enquiry. This makes it possible to treat as a research-able question the complex challenge of whether and how the dramaturgy of situations in contemporary social life is inflected by the computational settings in which they unfold, a proposal I will illustrate through a discussion of a digital social research project still under development, a semi-automated analysis of so-called "test drive videos" on the online video platform Youtube, which report on the introduction of intelligent vehicles into the social environment of the street.

2. Computational social science: extending formal analysis to contextual phenomena?

It has become de rigeur in social science to posit that the development of new forms of computational data analysis enables new ways of knowing society (Lazer et al, 2009; Ruppert, Law and Savage, 2013; Salganik, 2018; Author, 2017). While in the 2000s, debates about the new computational social resesarch focused on the affordances of the Internet as a resesarch environment (Hine, 2000; Miller and Slater, 2000; see also Author, 2000), and later in that decaded, on industry-led developments in digital data analytics such as the rise of geodemographics (Savage and Burrows, 2007; Ruppert et al, 2015), in recent years scholarly attention has shifted to the capacities of advanced, "intelligent" computational methods (Elish and boyd, 2018; Castelle, forthcoming). While still tethered to industry hype cycles, todays debate about digital ways of knowing society has produced a distinctive methodological claim, namely the idea that sophisticated new forms of computational analysis, such as machine learning, natural language processing and computer vision have endowed computational science with *the capacity to render contextual phenomena amendable to formal analysis* (Bechman and Bowker, 2018; Cointet 2018; Zubiaga et al, 2017). Social phenomena that were previously considered to require interpretative research of some kind - such as ethnographic fieldwork or discourse analysis - can today, they suggest, be brought within the remit of formal, automat-able data analysis.

Many of today's proponents of the new computational social science have backgrounds in the sciences, and the current generation seems less inclined than their predecessors to produce summary methodological statements, but it is not difficult to detect in publications in this

area the above methodological proposition. In the area of textual analysis,[1] the French scientists Cointet and Parasie claim that new, informatics and AI-enabled approaches can today be used to elucidate sociological phenomena, as methods like Natural Language Processing can be integrated into approaches that take into account "the context of the production of textual inscriptions," therebye recovering their "social thickness" (Cointet et Parasie (2017), p. 3). Tornberg and Tornberg (2016) propose that the statistical textual analysis method of topic modelling can be used to study discourse, which they defined as "communication in context", because ""it explicitly models polysemy (cf. DiMaggio, Nag, and Blei, 2013), i.e. the notion that words can obtain multiple meanings depending on the context they are used in. In fact, what topic modelling does can be summarized as tracing the multiplicity of contexts of every word in the corpus." (p. 5). Dong Nguyen (2016), who conducts linguistic analysis of social media data, makes a similar claim when she states that social media platforms offer "(a) rich contextual data, such as social network information; (b) the opportunity to study language use and human behavior in a multitude of social situations" (Nguyen, 2016; p. 3).

While these commitments to contextual understanding seem largely in line with those of interpretative social enquiry, further probing reveals that the understandings of context invoked in the methodological papers above are unconventional in a number of respects. The types of contexts that computational social science claims to be able to render amendable to formal, automated analysis have a different structure, than the one that interpretative social researchers have long claimed is only accessible through qualitative methodologies such as ethnography and discourse analysis. Take the project of Dong Nguygen (2016), which is to "automatically infer social variables" - such as age and gender - "from text" (p. 25) in social media analysis. This in her view requires taking the situational character of social media interaction into account. As she puts it, in social media analysis attributes (age, gender) are best treated as performative categories, because their enactment is context specific. Citing Judith Butler, Nguygen explains that it is not just that young women have a different social media style than, say, older men, discernment of these different styles requires taking the communicative context into account (e.g "speaking with friends", "flirting") [..], and concludes that "using contextual information is the only way to improve predictive accuracy

[1] I limit my discussion to social science applications of informatics-and AI-based approaches to *textual analysis*, mostly for pragmatic reasons: it is an area with which I am relatively familiar, and where I first encountered claims to contextual knowledge acquired by automated means.

of gender classification based on 'text only'" (Nguyen, p. 35). However, in contrast to Judith Butlers performative theory of gender, Nguyen's justification for taking context into account is to identify co-relations (between gender and speech) – something which mostly leaves out of account *the effects,* on the level of the situation – of the use of gender-specific speech. Indeed, Nguyen explicitly states that her aim is *not* to grasp the uniqueness of the situation**,** but to maximize the predictive capacity of social data analysis by generalizing from situational language use to demographic attributes.[2] In this version of contextual analysis, then, the research objective is to abstract generalizable features of human behaviour from situations (Kelleher and Tierney 2018) - an objective that is very different from the commitment of interpretative enquiry to understand situational dynamics as a social phenomenon in itself.

This commitment to generalizability can be found in many computational analyses of contextual phenomena, and it leaves its mark in the very conceptualization of "context" in these studies. Take the study of stop-search encounters with the police by Voigt et al (2017), which uses statistical methods of textual analysis to study interactions during street encounters with police. Analysing verbal interactions captured by body cameras worn by police officers, they sought to determine whether there is racial bias in the ways police officers address citizens. What stands out in this study from my perspective is the focus on a highly ritualized situation, like “stop and search.” Ritualized situations, such as encounters with the police, and, in a diferent way, the flirting situations analysed by Nguygen, are likely to have stable features, which repeat themselves across different instances, and can therefore be more easily inferred using quantative methods. This focus on situations with repeat-able protocols can be contrasted to the interpretative framing of situations in sociology and anthropology, **where situations are considered valuable analytic foci precisely insofar as they present moments of disruption:** occasions in which interactional scripts break down, are pushed to their limit, or require repair or adjustment (Woolgar and Neyland, 2008). It is this latter understanding of why context matters that seems especially at risk of being

[2] Nguygen follows literature in socio-linguistics in setting as her objective the determination of stable and transferable features of social situations: "the project of describing the varieties of language focuses on the constant features of the situational circumstances of language events, that can be consistently related to varieties in the language texts." (Gregory & Carrol, 1978, p. 10)

bracketed in the new computational social science: as computational social science seek to produce generalizable accounts of social behaviour, it runs counter to the idea that social life *as it is situationally produced* is not reducible to convention or rule-following, and can therefore not be grasped by rule-based descriptions of it. This is where interpretative enquiry is needed.

3. We have a situation: the methodological importance of 'break down' in interpretative social enquiry

In interpretative traditions developed in sociology from the early 20th century onwards, the analytic importance of situations has been established on very different grounds than in recent computational social science. For the former, the analytic value of situations derives at least in part from the resistance of social activity to stabilization and generalization that becomes apparent here. This point was forcefully made by Erving Goffman, who is well-known for undertaking fieldwork studies of everyday situations, and who chastised what he called "correlational" analysis of situations for merely documenting "the geometric intersection of actors making talk and actors bearing particular social attributes", noting that "I do not think this approach is always valid. Your social situation is not your country cousin" (Goffmann, 1964, p. 134). Goffmann rejected the *generic* understandings of situations produced by correlational analyses, insofar as they did not acknowledge the **underdeterminacy** of situations, which, in his useful characterisation, are marked by the difficulty of formulating a simple, single answer to the question "what is going on here?" (Goffman, 1964). For Goffmann, an adequate interpretation of situations cannot be produced from a distance, by relying on abstract or typical understandings. This is because the definition of "what is going on here?" is at least partly an accomplishment of interaction within the situation itself, and can therefore only be achieved, and documented, by observing the situation "from the inside."

The idea that social life cannot be adequately understood through formal analysis was not only made by symbolic interactionists, of which Goffmann was a key representative, but also by ethnomethodologists, like Harold Garfinkel. Crucially, in the latter approach this idea was extended to *mediated* situations unfolding beyond the face-to-face. Anne Rawls, in her 2008 introduction of Harold Garfinkel's theory of information, criticizes efforts to model situations for obscuring the **constitutive contingency** of social life, an open-endedness or uncertainty, if you will, that can only be made manageable as part of the unfolding of social life across

settings. As she put it, formal analysis is ill-adapted to the analytic objective of surfacing *the constitutive process of the production of shareable interpretative frameworks* in social life. As she writes:

> formal analysis eliminates details of precisely those constitutive and non-generalizable, [..] detailed aspects of social processes of understanding that are crucial to information theory (p. 35). [..]. Information is situated. We must study those constitutive orders that naturally develop to manage and order contingencies. Abstract models do not help. What they do is obscure the contingencies that should be the focus."

For Rawls, these contingent processes of mutual coordination that happen in situations also extend to situations involving communcations across settings. For this reason, a science that disregards these processes of contingent attunement between actors do not just limit our ability to understand what goes on face-to-face interactions, but in social life as such.

In the symbolic interactionist and ethnomethodological traditions, situations are then valued as sites for observing mutual coordination or attunement among actors as an inevitably situated process: understanding of the situation can only emerge from the situation. Other interpretative traditions in sociology, such as actor-network theory and pragmatist sociology, value situations as occasions where shared understandings and assumptions are called into question, and break down. For actor-network theory (Latour, 1987) and the sociology of critical capacity (Boltanksi and Thevenot, 2009), a situation is first and foremost marked by the possibility of *dispute* about "what is going on here", situations arise **when it is no longer possible to carry "in the habitual way," by relying on conventional, engrained and repeated ways of doing** (Boltanksi and Thevenot, 1999). A similar approach is taken in American pragmatist sociology, where situations came to be defined as "problematic, high-stake episodes that cast our prescribed roles and trajectories into question" (Missche and White, 1988, p. 697).[3]

[3] These sociological understandings of situations in terms of disruption builds on the concept of the "problematic situation" developed by the American pragmatist philosopher John Dewey, in order to draw analytic attention to moments "when there is something the matter; when there is some trouble to be done away with, some need, lack or privation to be made good, some conflict of tendencies to be resolved[.]" (Dewey, 1908 (1955), for a discussion see Author, 2012). For Dewey, it is by studying these type of moments marked by problematicness, that we may understand how knowledge, politics, and morality work.

This is not the place to provide a more detailed intellectual history of the conception of situations in pragmatist sociology, but the main point to take away is that situations here present relevant foci of social enquiry precisely *because* they are *not* routine, and do not repeat themselves exactly. It is not only *because we cannot* assume an agreement about 'what is going on' – among the actors involved, nor among analysts - that sociologists should pay careful attention to situations. Situations present moments in which *rule-following can break down*, moments it is no longer possible to proceed on the basis of routines, as captured by the expression "we have a situation" (Boltanksi and Thevenot, 1999). It is this insight - that social life cannot be conclusively defined in terms of "rule-following" - that led pragmatist sociologists to posit that situations resist purely formal, rule-based forms of analysis - and which becomes newly relevant today, in a context where computational social science claims to be able to render social life amendable to formal analysis.

To sum up, the claim that situations have been rendered amendable to formal scientific analysis in social data science relies on a highly particular definition of the situation, in terms of repeated and thus forma-lizable features and the patterned relations between them. Such a formal approach to situations stands in sharp contrast to those advanced in interpretative sociology and related traditions in philosophy, where situations have been characterized in terms of underdeterminacy, constitutive contingency and problematicness. From the latter perspectives, formal analysis by necessity leaves key aspects of situations out of account: it fails to engage not only with the uncertainty of situations but with their *unresolved* character. In a given situation, which interpretation of the situation will prevail and prove adequate is *not just unkown but fundamentally in question*, the peculiar challenge of the situation being that *the definition of the situation is at stake in the situatio*n, and is likely to be partly decided by how it unfolds. For authors like Goffmann and Rawls, the analyst can only apprecriate this formative feature of situations by adopting a position *inside the situation*. From this perspective, the claim that formal computational methodologies can be used to understand social context involves a trick: it imposes a particular definition of context, which is identifiable by detecting patterns of language use, and thus, can be characterized in terms of transferable and generalizable features, which is at odds with the understanding of what makes social like a contextual accomplishment in interpretative social enquiry, namely its

situational character: social life as contingent, site-specific, and marked by rule breakdown.[4] The type of contexts that social data science claims to render amendable to formal analysis *is a different type of context* from the one sociologists and anthropologists have claimed is only accessible through interpretative methodologies. I now turn to the question: if we were to take the above interpretative understanding of situations seriously, how then could computational methodologies inform our understanding of them?

4. The situation is dead, long live the situation: the transformation of aboutness in a digital society.

Faced with confident claims by computational social scientists that they are able to analyse social phenomena previously deemed to be inaccessible to formal analysis, like context, it is tempting for interpretatively inclined social researchers to fall back on classic critiques of scientific methodology, such as those developed by Goffmann and Rawls. But it is crucial that we critically review taken-for-granted assumptions *on both sides* of the debate between formalist and interpretationist approaches. There are two reasons for this. First, *the rise of computational forms of social analysis are justly considered exciting because they open up alternative directions for methodology development: they may enable changes in the relation between interpretation and formalization in social research*. Secondly, the problems with formal analysis in computational social science today are potentially different from the problems previously identified by sociologists. For instance, Goffman and Rawl's criciticisms above concern **interpretative accuracy**: formal analysis is not capable of producing adequate accounts of social life. However, today we are facing a somewhat different issue, that of **analytic capacity** of computationally enabled social science: the reliance on formalist methods risk to to result in the bracketing of crucial dynamic in computationally-intensive societies, namely the very transformation of situational logics in and of social life.

Karin Knorr Cetina (2009; 2014) has made an important contribution to surfacing this conundrum. She argues that in a digital society the very composition and nature of "situations" is changing. Starting from the often-made observation that the importance of face-to-face situations has diminished in technological, media-intensive societies (see also Dorothy Smith, 1990; Marvick and boyd, 2010), Knorr-Cetina argues that this shift affects

[4] This understanding has been primarily developed in ethnomethodology, actor-network theory and pragmatist sociology. As Reviewer 1 helpfuly remnded me, in Goffman's symbolic interactionism, too situations are defined in terms of their repeated, regular character, as "recurrent forms of interaction"

not just community bonds or sociality, but the *situational fabric* of social life: face-to-face situations – which "are foundational for how we conceive of the emergence of sociality and effects like trust" (Knorr-Cetina, 2014, p. 47) – are being gradually replaced by "synthetic situations." The latter do not require "being there in person but allow for participants and objects to be dispersed and still process things interactionally and collectively" (Knorr-Cetina, 2014; p. 47). And: "a synthetic situation is a composite, an assembly of information bits that may arise from many areas around the world and feature the most diverse and fragmented content" (Knorr-Cetina, 2014; p. 49). To develop this argument, Knorr-Cetina draws on field research on electronic trading, and she also discusses marital conflict via Skype, but her aim is to offer a general diagnosis of digital societies, as marked by interactional conditions *that put the status of situations itself at risk*. In digital societies, "conditions that were once central and held to be universal may change" (Knorr-Cetina, 2014; p. 46). As an aside, it strikes us that Goffmann already pointed to this possibility, when he wrote: that "Situations warrant an analysis in their own right, *at least in our societies*" (Goffmann, 1964; p 134).[5]

Knorr-Cetina argument then brings into view a fundamental, empirical transformation of situations in computationally-intensive societies, which is likely to remain out of view as long as computational analysis is focused on *routine* situations. The methodologically ordained pre-occupation in social data science with repeated, regular, conventional, generalizable situations risks to leave out of consideration key constitutive features of situations in a digital society, in particular, the precarity and increased difficulty of accomplishing a shared interpretation of what is going on here. As Knorr-Cetina puts it, "situational integrity" is much harder to maintain in the mediatized setting of the synthetic situation than in the face-to-face. In mediated situations, "*the result is much more likely a muddle* [italics ours]: a disorderly interactional arrangement struggling with problems of differential access, orientation and perspective, and coordination" (p. 47). It is then not just that a share-able interpretation of "what is going on here" is difficult to accomplish in synthetic situations, its accomplish-ability is compromised, as is the possibility for share-able

[5] The complication before us, then, is that context refers to both a methodological construct and a feature of social reality: As the anthropologist Morita (2013) put it: "The problem of context consists of both the issues concerning the connections found in the field and the way the researcher contextualized the object of study" (p. 218) - neither context can be assumed as "given", ontologically or epistemically speaking (see also Asdal and Moser, 2012).

interpretations of the situation to detectably break down.[6] One of the possible results of these broad and complex transformations is that a key feature of situations, namely account-ability[7] between actors, comes under pressure. Precisely where the situation presents a mudlle, actors may be more inclined to opt for more generic and conventional forms of communication. Situations in mediated settings would then be *both* more disordered, and provoke more generic forms of communication – *actively contributing* to the demise of situations as defined by Missche and White (1988), in terms of problematicness, as "cast[ing] prescribed roles and trajectories into question," and offering occasions for actors to *account* for roles, trajectories and relations.

Knorr-Cetina also points to alternative methodological understanding of *what composes the situation*. The notion of the synthetic situation highlights the constitutive role of compuational settings, like electronic trading platforms, and digital media architectures, such as Skype, or the body camera's worn by the police officers in Voigt's study, in the organisation of situations. From this perspective, computational media architectures and devices do not just present a condition of possibility for sociality, and its analysis, they participate in the very articulation of the situation qua situation. It is this that is only rarely acknowledged in the naturalistic frameworks of computational social science, which treats situations as "what is depicted" in the data, rather than considering how "depiction", and the interactive media architectures that support it, are in part constitutive of the situation, to use the helpful distinction put forward by Nassauer and Legewie (2018, see below). In computational social science, the formative influence of computational architectures on the interactions and behaviours that it makes available for analysis tend to be coded in negative terms, and defined as a form of "reactivity", of which the influence on the analysis at hand should be minimized and counter-acted (Salganik, 2018, p. 36). Similarly, when Voigt et al (Voigt et al, 2017 (p. 21)) discuss the possible bias introduced by the presence of observers in stop-and-search situations - which may or may not include the body camera's worn by police offers (!) - they go on to show how this potential source of bias does *not* significantly affect

[6] Even the basic question of *who* constitutes the active and potentially active participants is ambiguous in many mediated settings. In most face-to-face situations the relevant participants are monitori-able by the interactants themselves, but in mediated settings one's audience is not so easily defined. The notion of "context collapse" put forward by Marwick & boyd (2010) points to something similar, although their notion pertains first and foremost to online communications, not to situations as such.

[7] We use the -able to denote a potential for observation, and related empirical operations, rather than their actuality. As sociologist like G.H Mead have long argued, the relevance of observation for social life is not limited to the actual monitoring of social life by actual actors, but **as a possibility** may inflect social life most decisively (see also Adkins and Lury (2012) special issue on *Measure and Value*).

their study. In computational social scientific studies, briefly put, computational and media infrastructures are defined as *ideally neutral frames*, which make possible observation and measurement but should *not* leave their mark in the situation, or, when they do, present *a negative source* of bias.

Knorr-Cetina's concept of the synthetic situation then allows us to pose the problem with computational social science' treatment of situations as follows: the framing of situations in terms of generalizable scripted behaviours may, in the long term, render unavailable for empirical analysis key social phenomena of our time, namely the socio-technical composition and transformation of situations, limiting social science's ability to inform wider understandings of "what is going on" in the digital society. I am struck by the extent to which computational social science focuses on stable, circumscribed situations (“flirting”; “stop and search”) - implicitly or explicitly defining social life in terms of stabilized rituals and interactional forms. What about situations that do not exhibit this type of regularity? The pursuit of generalizable knowedge and predictive capacity puts computational social science at risk of excluding from analysis phenomena that look like mere contextual noise or artefacts of machinic bias: the muddles we face when finding Twitter messages littered with too many hashtags, a comment space full of advertising and spam. If we follow Knorr-Cetina's analysis of synthetic situations, such muddles *may precisely be constitutive of the situations in which actors find themselves in computational societies* . The "aboutness" (Gross, 2016) of interaction, information and communication - their capacity to be "about" something, to find a referent in social and cultural life, the determination that some*thing* is definitely going on here - is *not* as a matter of course accomplished in mediated settings (see on this point also Lindgren, 2020). A conventionalist definition of “situations”, in terms of succesfully ritualized interaction, is likely to leave us - analysts, as well as actors - under-equipped to understand what is going on in digital societies.

Consideration of what counts as “a situation” in a digital society then brings into view the following methodological challenge: *If in computationally-inflected settings in society, infrastructures, media architectures and devices may play an active role in organising - or dis-organising - situations, how then should we analyse situations with the aid of computational methods?* From the methodological standpoint of "situational analysis" that I am articulating here, Knorr Cetina's account also has a number of limitations. Her definition of the “mediatized setting” is mostly limited to the digital front-end, being composed of what she calls screen-based technologies. As such, it more or less disregards the infrastructural

layer of computational architectures including that of communication and interaction formats (publishing, sharing, friending) and algorithmic selection (rankings and ratings). However, the latter seem precisely key to possible transformations of situations in today's computational societies. As interpretative social researchers have recently argued, it is precisely because of the relative invisibility of computational data architectures across society that their socio-technical framing - or possibly, de-framing? - of social life is at risk of being ignored (Ruppert et al, 2013; Author, 2017; Amoore 2018; Maguire and Winthereik, forthcoming). If we are to develop an understanding of how the status and composition of situations is undergoing transformation today, we should therefore extend our analysis of situations to include this infrastructural layer.

5. Situational analysis: an empiricist approach in interpretative computational enquiry

In the remainder of this paper, I would like to outline one possible way in which interpretative traditions in social research can contribute to addressing the above methodological challenge, namely, by making the situation a unit of **empiricist** analysis in computational enquiry. In proposing this, I follow a specific qualitative approaches to data analysis, namely Adele Clarke (2005) Situational Analysis (SA), which proposes a *compositionist* methodology for the study of situations. The aim of data analysis for Clarke is "to specify which entities – of varying scale and composition - make a difference in a situation " (Clarke, 2005; p. 78). An empiricist approach, that is, does not presume to know beforehand which entities are relevant to the situation, how they relate, what their status is (human or non-human, technical or natural or conceptual), or even "what is going on here." Instead, to determine *what entities are activated and deployed in the specification of the situation at hand is the objective of situational analysis*.[8] It seems to me that Clarke's

[8] Actor-network theory, and ANT-inspired methdologies, including digital forms of controversy analysis and issue mapping, make a similar, empiricist assumption. Here enquiry begins with these admittingly basic questions: who are the actors? what are the issues? where is it happening? (Author, 2015). This form of analysis relies on empirical, relational dynamics of networking, for the specification of relations of relevance between entities, which in turn enables analysts to answer the basic ontological questions above. Situational analysis also shares something else with the analysis of "issue formation": both posit a "something happening", something the matter, in John Dewey's formulation: "some lack to be made good" (see Author, 2012). In other words, this forms of analysis studies social life through the lense of dynamics of problematization. This indeed, is why networking dynamics can be relied upon to specify relations of relevance between actors: there is something to be resolved and actors are moving, and connecting, in the effort to make this happen. Situational analysis adds something to controversy analysis, recognition of how the *settings* of social life inflect how it unfolds: something is happening *here*. This makes situational analysis so valuable for the analysis of social life in computational environments: it allows us to engage with the "problem of the setting" : how the where of social life - its location - participates in its doing (and in issue formation).

approach has much to offer for a computationally-enabled, intepretative analysis of situations as they unfold in computationally inflected settings, for the following reasons.

First, Clarke's situational analysis explicitly recognizes the participation of technical and environmental entities in situations: In order to specify the heterogeneous composition of a situation, SA proceeds by constructing so-called compositional maps, discursive data visualisations populated by diverse elements including non-humans, technical entities, discourse, issues, organisations, and so on. This interpretative cartographic method also allows SA to recognize the dynamic nature of situations: "situational analysis favours analytics over theory, because the composition of the situation is always changing." (SA, p. 28) This makes it possible for situational analysts to recognize the constructive and/or destructive contributions of *different type* of entities - human and non-human - to the unfolding of situations in computational settings, from a camera on the chest of a police man to in a stop and search situation, to a like button on a Facebook page. Second, SA's aim is to surface latent, problematic realities: it does not "wait for emergence from data (…) as we must "actively detect silences in data" (p. 75). Situational analysis, that is, specifies entities that compose the situation not in a purely descriptive mode, but defines this task as *articulation work*, actively attending to what may be difficult to express. Third, Clarke's approach is able to recognize the capacity of situations to surface account-ability requirements on the actors implicated in them. With its commitment to specify "what makes a difference in situations," situational analysis makes it possible to operationalize situations as empirical occasions for account-ability. Fourth, Situational Analysis offers an *iterative approach* to data analysis: the construction of compositional maps and the specification of the situation is a qualifying operation, with involves the progressive curation of data and map, of figuring out the situation *and* determining what are its consequential elements, through a back-and-forth between empirical materials, data, concepts and visualisation.

As I will illustrate by discussing a pilot study below, Clarke's approach offers a possible way of analysing situations as they unfold in computational settings with digital methods. However, doing so also brings to the fore an important limitation of the approach. Even if SA does not define what composes the situaiton at the outset, it still seems to presume *a bounded and recurrent situation*. Clarke's SA presumes a world in which situations are detect-able as part of the process of data collection and analysis, without broaching the question of how socio-technical infrastructures problematize this very possibility. To be sure, Clarke

recognizes the importance of infrastructure, noting that "taken-for-granted, invisible non-human actors like "electricity" are generally assumed [to be in place]" but that "specifying such non-human actors is generally important" (Clarke et al. 2018, S. 19). But the approach nevertheless rests firmly on the assumption that there are **fields** of social activity, which can be transformed into ethnographic material, which then becomes the resource for interpretative inquiry. The delineation of situations is itself not problematized on infrastructural grounds, as part of the process of enquiry. However, situations as they unfold in computational settings often do not unproblematically belong or contribute to clearly defined fields of activity, and may present not-quite situations or semi-situations (what Karin Knorr Cetina calls "muddles").[9] In settings like these, not only the articulation of entities relevant to the situation – such as content, genre, and users - but also the relative (un-)boundedness of situations or not-quite situations, is a possible effect of the digital media infrastructures in which they unfold.

Insofar as the object of situational analysis is not only informed, but also *problematized*, by the computational settings in which they arise, it seems helpful to recognize the situations here do not unfold in a field, but in **a semi-field**, to use the term proposed by anthropologist by Ann Kelly (2012). Coined to characterize experimental huts, a kind of model home designed for the study of malaria in model villages in East Africa, Kelly defines the semi-field as "a stage upon which to observe [..] phenomena, bridg[ing] the distinct empirical terrains and methodological registers of the laboratory and the field." As Kelly points out, the semi-field "is located in the field, but it is not quite of the field": these articifical environments are explicitly designed with the purpose to render monitor-able and analys-able what happens in them. Just as experimental huts, computational environments like social media platforms are sufficiently "like" other environments in society, insofar as they enable social interaction, expression and organization, yet "they are controlled enough to facilitate intervention and manipulation of these activities, provid[ing] the artificial conditions required for the recording and analysis of these actions" (Derksen and Beaulieu, 2011; see also Author, 2017, p. X). It is in comparison to this relative artificiality of digital social life as studied in social media research, that it becomes clear how, by comparison, Clarke's approach is marked by what could be called a residual naturalism. The idea that the infrastructural environments in which social life happens can often be bracketed in the study

[9] This term was suggested by Fabian Muniesa. pers. com.

of social life, does not just mark the quantitative methodologies implemented in computational social science: traces of this assumptions can equally be detected in interpretative traditions in social research like Clarke's. This is understandable, in part as an empirical consequence of studying situations in which its infrastructural conditions do not constitute the problem at hand (for example, the availability of electricity not being the issue on a hospital ward under study). If we are to develop an interpretative analysis of situations in computational settings, the task at hand is then to develop a form of situational analysis that allows us to recognize the participation of infrastructures, media and devices in the situation.

6. Situating intelligent vehicle testing in society: A semi-automated analysis of test drives on Youtube

To illustrate how situational analysis may be operationalized - and developed - in computational social research I will briefly discuss a pilot study undertaken with colleagues in the Media of Cooperation Research Programme at the University of Siegen in 2017 and 2018. In this project, we turned to the online video platform Youtube to examine whether and how videos featuring self-driving cars undertake situated evaluations of new technology in environments in society, notably the street. In examining this, we built on recent work in Science & Technology Studies and Human Computer Interaction which has proposed that the appearance of 'intelligent' or smart vehicles in street environments presents an opportunity for social learning about technology "in the wild" (Laurent and Tironi, 2015; Brown and Laurier, 2017; Stigoe, 2018, Author, 2020). Thus, Brown and Laurier (2017) have analysed Youtube videos featuring Tesla cars in Autopilot mode, showing how these video's situate, contextualize and problematize intelligent technology by reporting on "real-life" experiences of driving and encountering these new technologies in the street. Building on this work, our project asked, can test drive video's featuring self-driving cars on Youtube be said to instantiate a **situational mode of evaluation** of the introduction of intelligent vehicle technology in environments in society? Do they render this event - the introduction of intelligent technology into the social environment - available for interpretation from the standpoint of the on-going happening of life in society, on the road?

Our question was informed by the following concern: while user-led evaluations of technology in the form of online video reviews have quickly gained currency in todays cultural economy, it remains in question whether and how this form of technology testing in everyday settings is capable of producing *evaluations* of new technology, and of ensuring the accountability of innovation. We wanted to establish whether and how user-generated videos

featuring self-driving cars rendered available for evaluation the type of situations that according to the sociology of technology enable social learning about innovation to take place: the testing situation, the moment in which the introduction of a new entity into social life disrupts habitual ways of doing, and in that moment compels social actors to engage in articulation work, specifying and evaluating features of technology, social life, and their interrelations (Star, 1999; Boltanksi and Thevenot, 1999; see also Latour, 2004). We asked: do Youtube videos of intelligent vehicles in street environments surface such testing situations, helping to render explicit the implications of self-driving vehicles for society? That is also to say, in taking up methods of Youtube video analysis, we sought to determine **whether** video reports of intelligent vehicles in the streets surfaced situations, and whether they enabled the type of account-ability relations that according to sociologists like Goffmann and Knorr-Cetina are facilitated by situations.

In focusing on the popular Youtube genre of "tech review," our study explicitly took digital media architectures into account. We approached situations, or rather, the situational, not as given in the data, but as entailing *a distinctive mode of publicity*, a mode of reporting that deploys contingent and contextual occurences and encounters in everyday environments like the street or the home in order to narrate and/or investigate the introduction of new technology into society.[10] However, this is also to say that we framed the relevance of media architectures from the standpoint of the situation that formed the object of our analysis: the introduction of self-driving vehicles into social environments. Because of this, we defined the significance of Youtube as a popular platform for technology review **not** primarily in terms of user-generated content (Arthurs et al, 2017), but in terms of facilitating technology review from situated standpoints in *mundane social environments*. This approach notably differs from other sociological research that relies on digital video to conduct situational analysis, such as the work by Nassauer and Legewie (2018) who define video data analysis as "focuse[d] on situational dynamics and behaviors using video or other visual data to understand how people act and interact, and which consequences situational dynamics have for social outcomes" (Nassauer and Legewie (2018, p. 2). As Nassauer and Legewie put it, they define situations in terms of what is depicted in video data (Nassauer and Legewie (2018, p. 2), whereas our pilot study sought to establish whether and how Youtube, as a

[10] As Hlajmar Bang Carlsen helpfully pointed out, the situation can be understood as a kind of meta- or infra-frame, that must be able to withstand disagreement at a lower level. This makes situations curate-able, something which becomes more relevant in computating-intensive societies, because the boundaries of synthetic situations are not given, and neither is their composition.

digital media architecture, enables situational modes of reporting and evaluating the arrival of technology in society. That is, we are interested in the extend to which online publicity platforms, like the Youtube media architecture, are *configured* in society (Pink, 2018) to enable the development and deployment of new forms of evaluating technology, in this case through practices of reporting test drives and sightings of self-driving cars.

To investigate this, we combined two different approaches to online video analysis, each of them adapting Clarke's situational analysis in a different way: 1) an interpretative mapping of situational elements in a small corpus of online videos and 2) a semi-automated textual analysis of a larger corpus of YouTube video descriptions collected via this platform's API. Thus, to start with we conducted data sessions loosely structured on the in-depth interpretation of video recordings that are the specialty of ethnomethodology, which on this occasion we referred to colloquially as "deep watching," to mark its contrast from the larger-scale textual analysis reserved for the second phase of our study. Working with an interdisciplinary group of scholars with backgrounds in digital media studies, Science and Technology Studies and sociology, we selected 15 online videos featuring driverless cars which potentially matched our description above: reporting on the appearance of driverless cars in the social environment in the situational mode.[11] We then watched and interpreted test drive videos featuring self-driving cars en groupe over the course of a few days, with two aims: a) to determine the relevant types of videos in our corpus, and b) to produce for each video type an initial mapping of constituent elements. After watching each video, we grouped the videos in three different categories: a) company demos (featuring on-the-road vehicle demonstrations by automotive and tech companies); b) DIY testing (amateur videos of test drives, featuring mostly Tesla vehicles in autopilot mode, recorded with dashboard cameras or smart phones and narrated from a driver's perspective).[12] c) the "view from the street," which consisted of recordings of third-party sightings of self-driving test vehicles (Google, Uber) in the street, by journalists and other external observers. Each of the video categories was marked by different cinematographic styles, with company video's tending to be professionally produced, while DIY testing and the "view of the street" following home video and real-time reporting conventions.

[11] Our initial video selection was thus theory-led and not in any way representative of the available population of self-driving video's on Youtube. It also means that the first, qualitative, part of our study, actually searched for "testing situations" in the data, and only in the second part did we adopt the evaluative stance to establish whether testing situations involving self-driving cars are reported with Youtube,

[12] A initial list of videos featuring street tests of intelligent vehicles was drawn from a variety of sources - collected news articles, colleagues' recommendations, the Youtube recommendation system.

Next, we identified notable elements in the videos in each of the three categories, loosely following Clarke's first step of situational analysis, situational mapping (Clarke and Charmaz, p. 15),[13] using sticky notes. Watching each video in silence, participants were asked to identify *heterogeneous entities featuring in the videos* which, in their view, could help to answer the question: which objects, actors, concepts and values are invoked in the videos to specify what is at stake in the introduction of autonomous vehicles into the street? Our provisional findings suggest that the demo videos produced by automotive companies made the most significant effort to narrate the social environments in which self-driving cars operated, featuring women (non-)drivers, diverse road users including cyclists, urban and road environments that were clearly named, and vehicle engineers discussing the unpredictability of the street environment. However, they did so not necessarily in a situational mode, since, as one participant put it, everything in the videos is so clearly scripted. DIY testing video's did remarkably little to report the environments through which the test drives were passing, focusing instead on vehicle performance and the driving experience (as one participant provocatively summed it up, "talking to self, in the fog"). By contrast, our siutational map for "views from the street" recorded a number of situational elements ("clumps of people on sidewalk", "a police car observing transgression", "test ground fenced off," and the enigmatic "ruins of the automotive society", referring to a grafiti covered underpass where one of the sighting occurred), but also includes viewer interpretations indicating that the curation of a testing situation was not quite accomplished in these videos ("not much happens," "car not strange enough", "people don't notice the vehicle"). For purposes of illustration, Figure 1 presents a transcription of this last mapping.

Figure 1: The "view from the street" situational map of online videos recording third-party sightings of intelligent vehicles, December 2017[14]

Seeking to extend our analysis beyond the speculative interpretation of our small, theory-driven selection, we then took the next step of conducting a semi-automated textual analysis of a larger corpus of YouTube video descriptions collected via this platform's API. To this

[13] "*Situational maps* lay out all the major human, nonhuman, discursive, historical, symbolic, cultural, political, and other elements in the research situation of concern. What appears in a situational map is based on what is in the empirical situation of inquiry—the researcher's project." (Clarke and Charmaz, 2019, p. 15)

[14] Transcription of the situational maps produced in sticky notes. Colours indicate whether elements contribute positively (green) or negatively (red) to articulating the introduction of self-driving cars into the street as a testing situation. The X-axis moves from rich (-1) vs poor (+1) test environment, the Y-axis moves from radical innovation (top) to incremental innovation) bottom). See also footnote 26

end, we constructed a larger corpus of Youtube videos of street tests of intelligent vehicles in the following manner: from a custom-made Twitter data set, consisting of tweets containing the terms driverless car, self-driving car, autonomous vehicle, and related terms between 15/10/2017 and 15/04/2018, we extracted all Youtube URLs (total 4052 video's).[15] We then queried the Youtube API to extract the video descriptions produced by the creators of these Youtube videos. Based on a selection of the Top 500 most frequently tweeted videos, and informed by the deep watching exercise, our study group proceeded to construct a lexicon of relevant terms for the analysis of these self-descriptions, identifying terms that could help to specify "what is going on here" (the situation) and could serve as indicators of the extent to which the video situated intelligent vehicles in environments in society. In doing so, we followed Gerlitz and Van der Vlist lexicon-based analysis of app video's on Youtube (see for a discussion Dieter et al, 2019): in populating our lexicon with terms (see Figure 2), we then constructed a model of the situation composed of heterogeneous entities extracted from our data, through a back and forth between our interpretative maps, our top 500 URLs, and constrained by the lexicon tool's technical limitations (for example, at this stage, we couldn't identify phrases). The resulting lexicon, consisted of two types of categories: 1) genres (news, demo, recording, humour, test) and 2) features (environment, business, technology, accidents). For each category we identified index terms, the aggregated occurence of which in the video descriptions of our corpus would indicate the category obtained for the video at hand.

Figure 2: The Lexicon: Intelligent vehicle test drives on Youtube, Siegen, 21-22 April 2018

Using an R script, we then applied the lexicon to the full corpus of video descriptions,[16] allowung us to establish the extent to which the different video genres we had identified – Demo, News, Promo, Test, Recording, .. - were populated by different types of entities (features). We then hypothesized that these different entity types could be taken as indicators of a situational mode: a strong presence of entities in the category road environment (zebra crossing, traffic light, side walk) would indicate a comparatively speaking more situationally

[15] The Twitter data set was collected using TCAT (Borra and Rieder, 2012). Query: intelligent vehicles. Date range: 15/10/2017-15/04/2018. From this data set, we extracted 4027 Youtube URLs for subsequent analysis.
[16] This script was coded by James Tripp, and has since been developed into the data tool Le-CAT, see https://warwick.ac.uk/fac/cross_fac/cim/tools

grounded mode of reporting, then a large presence of entities in the category business (brand, invest, market). Through a correlational analysis (see Figure 3), we were then able to produce an overview of different types of entities featuring in the various genres of video's: media-specific terms (brand, promote) as well as actor types (pedestrian, cyclists, police), and environmental entities (traffic light; zebra crossing). Noting that video's in the category "test" have proportionally speaking a wider range of environmentally specific features as compared to video's in the category "demo", we tentatively attribute to the former genre of videos a greater capacity to locate intelligent technology testing in environments in society, and the potential to conduct an evaluation of technology in the situational mode.

Figure 3: Correlating Genre and Feature; Semi-automated lexicon analysis of 4052 driverless Youtube video's, Warwick/Siegen, April 2018

To be sure, this analysis leaves many questions unanswered, including that of whether and how test drive videos on Youtube enable the enactment of accountability relations, both within the dramaturgy of each video, and as media circulating in YouTube infrastructures and beyond. Neither does our lexicon analysis enable us to specify in sufficient detail how the media architecture of the Youtube platform leaves its mark on the "testing situations" in the videos under scrutiny, although it was clear to us that they do. In parsing Youtube video descriptions for our lexicon building exercise we encountered lots of material that pointed in this direction, from a Tesla test drive "channel" set up to enable monetization of Youtube content, to attention seeking content like a demo of how to put make-up on while driving in Autopilot mode. What we called above the "infrastructural layer" of online platforms equally left its mark on our analysis. For one, in turning to a Twitter data set to extract the larger set of Youtube URLs featuring driverless cars, we gave the latter social media platform a role in the delineation of the "testing situation" under scrutiny, the appearance of self-driving cars in street environments. This begs the questions: appearance in which street, where? At which level is "the situation" constituted, in our semi-automated online data analysis? While our lexicon analysis suggests that situational mapping as an interpretative method can be scaled up using automat-able, lexicon-based methods of data analysis, these methods at the same time introduce platform effects into our very delineation of the "situation" to be interpreted. However, to understand the participation of infrastrucutres in the situation under scrutiny, we would need to extend our situational mapping to include media-specifc elements beyond the frame, like channels.

6. Conclusion: from situational analysis to situational analytics

This article has identified some formative features of an interpretative approach to situational analysis that I believe can make important contributions to computational social research, and equip it to address possible transformations of the situational fabric of digital societies. What are they? First, situational analysis explicitly recognizes the participation of non-human elements, like media architectures and genres, in situations. As such, it enables us to study situations as distributed accomplishments, which are produced through the coming together of heterogenous elements, including in situ occurrences (a car encounters a traffic sign on a road), media genres (the test drive) and infrastructural effects (tweeting Youtube URLs). Second, in situational analysis interpretative and computational methods can be combined to analyse situations marked by the *de-stabilization* of routines, such as the introduction of new technology into the social environment. By using computational methods of data analysis, we tend to restrict ourselves to formal analysis, focusing on the detection of repeatable patterns across settings. This was also the case, for instance, in our lexicon-based analysis. However, such a focus on the detection of regular patterns does **not** necessarily mean that we have to limit our analysis to ritualized, routine interactions. By adopting an empiricist approach like situational analysis, we can use computational methods to study less stable, disruptive, testing situations too.

However, the analysis presented here moves beyond situational analysis in at least one decisive way: it proposes a way to scale up the interpretative study of situations. Using methods of situational mapping, we can document *which entities of varying scales may make a difference to "the situation",* and this can be done through a variety of means, from sticky notes to semi-automated lexicon-based analysis. However, in scaling up situational analysis in this manner, to practice what I call "situational analytics," we inevitably face different kinds of challenges from situational analysts working with ethnographic data: working with large, digital data sets derived from online platforms and other large-scale data infrastructures, our analysis becomes inflected by media and data infrastructures in society in distinctive ways: here, "what makes a difference" is irrevocably marked by infrastructural latencies, or what Amoore (2018) calls the subvisible –socio-technical architectures and socio-material conditions left implicit in digital interfaces. Which is also to say, the boundaries of situations, where they begin and end, is unlikely to be "given in the data." Instead, situational analytics requires the analyst to *actively curate* the situation under study, and establish clear relevance conditions.

The above features mean that situational analytics as described here, is equipped to to address possible transformations of the situational fabric of digital societies. It is able to analyse semi-situations, in which "aboutness" – the capacity of a situation to have a coherent referent – is not necessarily accomplished. To be sure, any analysis of social life must assume that aboutness obtains, and it is needed to ensure the situational. But the situational analysis put forward in this paper does *not* see it as its job to repair, or re-instate this aboutness, and secure the natural qualities to the object of analysis by means of its analytic framework. The analyst's job is not to sustain naturalist definitions of social situations but to offer critical, empirically informed evaluations of the capacity of computationally mediated settings to surface situations in various ways. However, this also means that situational analysis must expand its scope and examine **how** the distinctive features and capacities of situations – demonstration, problematization, accountability – surface in environments in society. A naturalistic definition of social situations inhibits precisely this: defining situations in terms of rituals and protocols, it becomes very difficult, to examine empirically what constitutes – or fails to constitute – a situation in computational environments in society.

To make the case for an interpretative analysis of situations, then, is **not** to reject automated and formal data analysis as a social research methodology. It is to challenge *the tendency to naturalism* implicit in many contemporary instantiations of computational social science methodology, as it is in other approaches. Coming to terms, methodologically speaking, with the artifice – with the synthetic or compositional nature - of social phemonena in a digital society requires letting go of naturalism in its many varieties. This project is what I have in mind when calling for a move from situational analysis to situational analytics. We must devise interpretative forms of analysis which are able to recognize that situations are not "given" in society, but artificial, in question, and inflected by curatorial interventions on the part of both social actors and analysts, as well as of the computational and media architectures in which they unfold.

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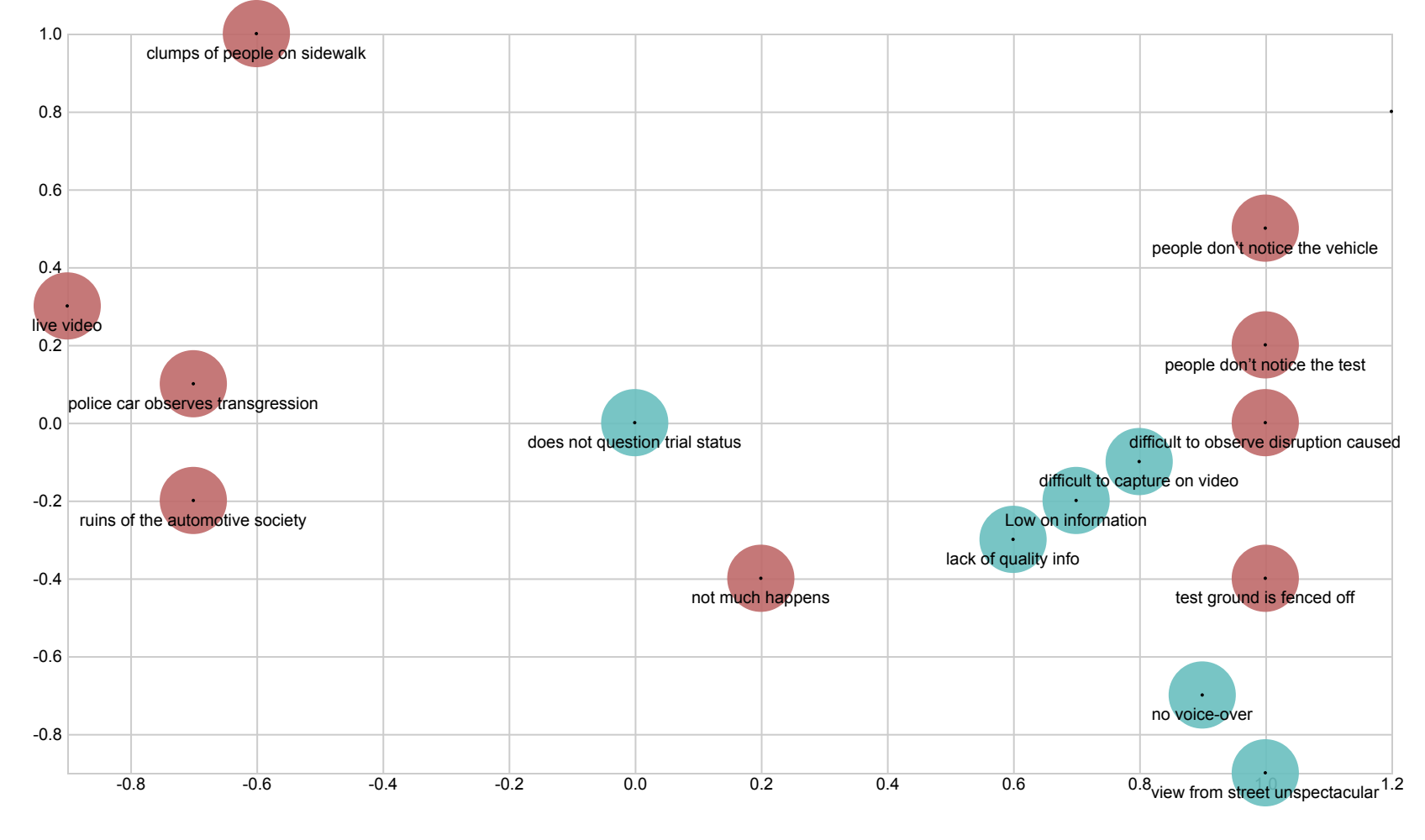
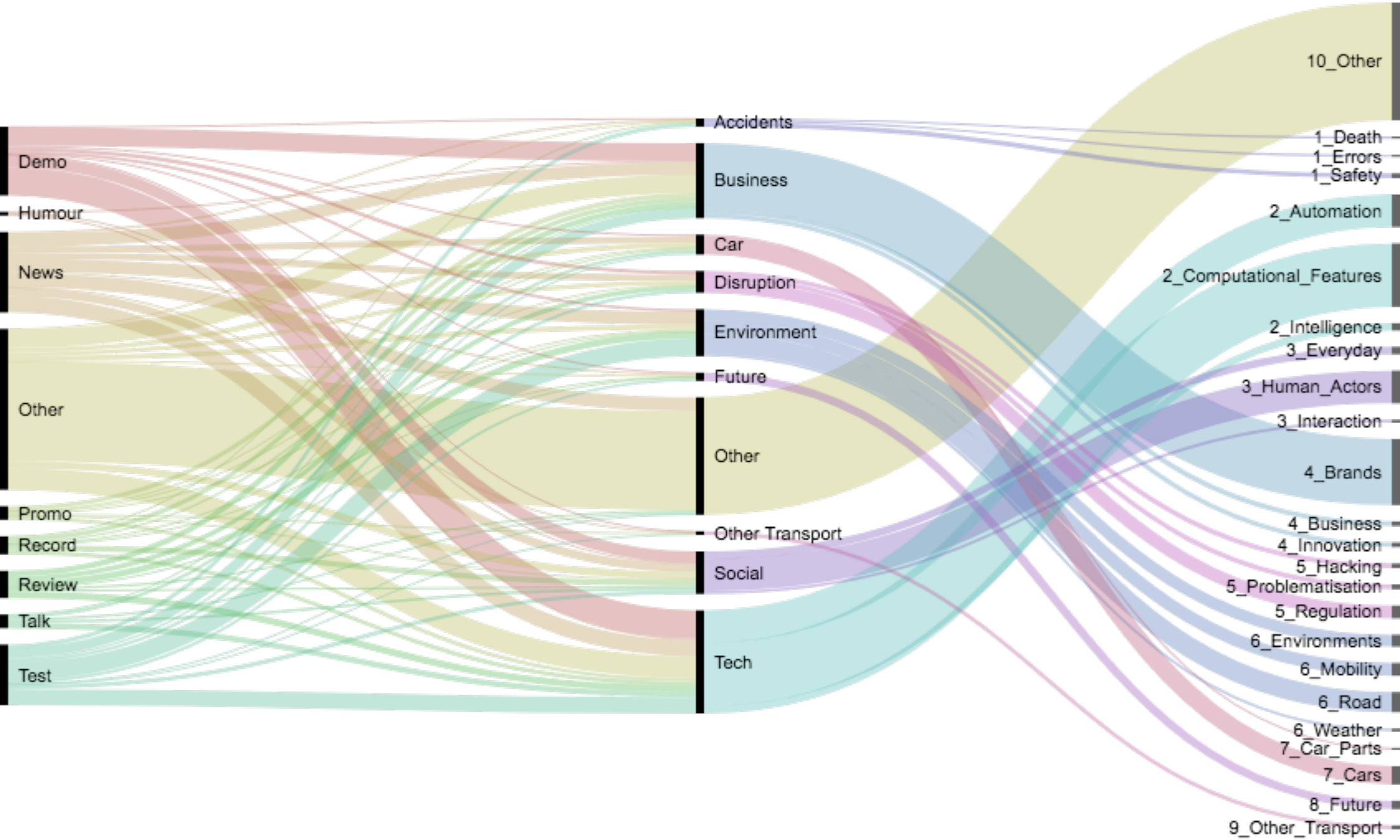

clumps of people on sidewalk
live video
police car observes transgression
ruins of the automotive society
does not question trial status
not much happens
people don't notice the vehicle
people don't notice the test
difficult to observe disruption caused
difficult to capture on video
Low on information
lack of quality info
test ground is fenced off
no voice-over
view from street unspectacular
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-0.8
-0.6
-0.4
-0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2

Type	Category Grou	Category	Count	Queries																			
Formats		**Test**	17	prototype	sighting	realtime	log	spin	happens	try	risk	tested	tried	probe	trial	fail	mistake	challenge	testing	tests			
Formats		**Talk**	12	interview	lecture	keynote	interview	presentation	comment	talk	conference	congress	expert	insider	insight								
Formats		**Demo**	6	hack	demo	how	works	experience	showcase														
Formats		**News**	11	report	news	media	story	stories	CBC	CNN	WIRED	TED	says	said									
Formats		**Promo**	8	market	opportunity	investment	concept	preview	trailer	advertis	announce												
Formats		**Review**	5	reaction	success	assess	review	rate															
Formats		**Record**	10	dashcam	footage	material	recording	livestream	live	realtime	footage	spotted	camera										
Formats		**Instruction**	3	tutorial	explain	how																	
Formats		**Humour**	8	prank	sketch	parody	comedy	comic	funny	joke	laugh												
Formats		**Other**	12	game	NBA	Championship	quarter	player	lyrics	basketball	james	lebron	cleveland	denver	song								
Features	Accidents	**Accidents**	5	crash	casualty	collision	collide	struck															
Features	Accidents	**Safety**	10	save	lives	warning	hazard	lives	risk	safe	safety	emergency	sleep										
Features	Accidents	**Death**	5	kill	dead	wreck	manslaught	death															
Features	Accidents	**Errors**	9	error	mistake	deviant	failure	drunk	transgress	wrong	bug	fail											
Features	Tech	**Automation**	9	machine	automat	robot	algorithm	autonomous	self-	agent	simulation	artificial											
Features	Tech	**Intelligence**	10	predict	learn	decide	navigat	find	cognitive	percept	thought	perceive	intelligen										
Features	Tech	**Computationa**	13	adaptive	assist	detect	identif	lidar	radar	autopilot	comput	cloud	capacitor	autosteer	radar	control							
Features	Social	**Human_Acto**	17	pedestrian	cyclist	driver	human	CEO	woman	friends	family	passengers	chauffeur	reporter	observer	generational	person	people	user	women			
Features	Social	**Everyday**	6	work	sleep	commute	workplace	live	home														
Features	Social	**Interaction**	7	interact	avoid	behaviour	hands	steer	stop	society													
Features	Business	**Innovation**	14	leap	innovation	develop	startup	remake	change	perfect	solution	pod	prototype	concept	launch	mainstream	progress						
Features	Business	**Business**	5	company	invest	market	business	enterpr															
Features	Business	**Brands**	14	tesla	google	waymo	uber	bosch	bmw	mercedes	audi	nvidia	toyota	ford	cisco	silicon	Yandex						
Features	Disruption	**Problematisa**	5	controversy	delay	issue	disput	dilemma															
Features	Disruption	**Regulation**	18	permit	legal	bans	law	sue	regulation	court	banned	forbid	restrict	restriction	disclosure	fine	evidence	public	moral	investigation	evaluat		
Features	Disruption	**Hacking**	4	hack	holtz	DIY	comma																
Features	Environment	**Road**	11	freeway	highway	street	curved	light	road	lane	sign	congestion	pothole	traffic									
Features	Environment	**Weather**	6	fog	storm	snow	rain	sun	clouds														
Features	Environment	**Environmente**	19	urban	city	world	neighbourhoo	copenhagen	greenwich	local	singapore	stuttgart	shenzhen	moscow	landscape	america	pittsburgh	london	francisco	rural	suburb	village	
Features	Environment	**Mobility**	11	miles	distance	race	speed	travel	kilometer	journey	drive	mph	accellerat	motion									
Features	Car	**Car_Parts**	6	door	wheel	pedal	brake	seat	modular														
Features	Car	**Cars**	6	vehicle	car	SUV	truck	wagon	automobile														
Features	Future	**Future**	7	generation	future	forward	dream	inevitable	vision	years													
Features	Other Transpo	**Other_Transp**	8	metro	bus	taxi	bike	transport	minivan	bicycle	shuttle												


Demo
Humour
News
Other
Promo
Record
Review
Talk
Test
Accidents
Business
Car
Disruption
Environment
Future
Other
Other Transport
Social
Tech
10_Other
1_Death
1_Errors
1_Safety
2_Automation
2_Computational_Features
2_Intelligence
3_Everyday
3_Human_Actors
3_Interaction
4_Brands
4_Business
4_Innovation
5_Hacking
5_Problematisation
5_Regulation
6_Environments
6_Mobility
6_Road
6_Weather
7_Car_Parts
7_Cars
8_Future
9_Other_Transport