Historicising Material Agency: from Relations to Relational Constellations

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Abstract Relational approaches have gradually been changing the face of archaeology over the last decade: analytically, through formal network analysis, and interpretively, with various frameworks of human-thing relations. Their popularity has been such, however, that it threatens to undermine their relevance. If everyone agrees that we should understand past worlds by tracing relations, then 'finding relations' in the past becomes a self-fulfilling prophecy. Focusing primarily on the interpretive approaches of material culture studies, this article proposes to counter the threat of irrelevance by not just tracing human-thing relations but characterising how sets of relations were ordered. Such ordered sets are termed 'relational constellations'. The article describes three relational constellations and their consequences based on practices of ceramic fine ware production in the Western Roman provinces (first century BC–third century AD): the fluid, the categorical and the rooted constellation. Specifying relational constellations allows reconnecting material culture to specific historical trajectories and offers scope for meaningful cross-cultural comparisons. As such, a small theoretical addition based on the existing toolbox of practice-based approaches and relational thought can impact on historical narratives and can save relational frameworks from the danger of triviality.

Keywords Relations · Material agency · Ceramic production · Practice · Trajectories

Relations, Relations, Relations

In an era of archaeological scholarship without—or beyond—master narratives (Hegmon 2003; Wylie 1993), one of the closest things to a paradigm shift over the last decade has been the adoption of relational approaches. The 'relational turn' has affected both analytical models, such as formal network analysis, and more interpretive

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approaches, many of them joined under the banners of human-thing relations and material culture studies.

Analytically, the last decade of archaeological research has seen a true surge of methods aimed at tracing, plotting, and measuring relations in the past (Brughmans 2010, 2013; Knappett 2011, 2013). Most of these methods fall under the heading of network analysis: computer-driven applications of graph theory that can both analyse and visualise connections between entities (Freeman 2004). Those entities can be people, communities, things or places. The relations between them can represent things travelling, knowledge circulating, shared traits, or physical access routes (e.g. Collar 2007; Graham 2006; Mills *et al.* 2013; Mol 2014; Sindbaek 2007). A focus on relations turned the analytical picture of archaeology inside out. Archaeology has always tended to list entities such as attributes, artefacts, or sites, or to plot them as dots on a distribution map. With network analysis, this traditional end point became the starting point for analysis, tracing the relations within the lists or between the dots on the map. Discussion of the analytical drawbacks and benefits exceeds the scope of this paper (Butts 2009; Knox *et al.* 2006; Brughmans 2013 for archaeology), but in general, a focus on relations allows bringing in a larger number of variables and devising more complex models for the spread of traits.

This article is concerned mainly with the uptake of relational thought in more overtly interpretive approaches in archaeology. The interest in relations can be traced back to groundbreaking ethnographies of the 1980s and 1990s. Foremost among these is Marilyn Strathern's *The Gender of the Gift* which showed that Melanesians do not share our western notion of bounded individuals, each possessing a series of qualities that remain unaltered throughout the variable relations they enter (Fowler 2010: 368–371; Strathern 1988). Instead, their personhood has been described as 'dividual': Each person is constituted by specific sets of relations or exchanges of substances, with each of these relations bringing a specific quality to the overall person-as-assemblage. As a result, qualities are no longer predefined (e.g. male or female) but change as relations do. Both the concept of dividual and the general notion of relational personhood have been taken up as a means of interpreting archaeological assemblages (Brück 2001; Fowler 2004).

Around the same time as the ethnographic discovery of relationality, sociology put relations to the fore in explanations of our contemporary world. These explanations revolved largely around the concept of globalisation: We live in a tightly connected world, in which changes or actions in one part can have consequences in an area far removed (Appadurai 1996; Bauman 1998). Earlier ethnographies, such as Sidney Mintz's (1985) exploration of the intercontinental relations between sugar consumption and the slave trade, had opened up a similar line of inquiry. The global scene is no longer composed of one or two easily defined powers and their spheres of influence but has become a complex maze of interrelated interests, assets and allegiances. This new conceptual vocabulary— also centred on relations—has in turn led to globalised readings of past phenomena (Foster 2006; Pitts and Versluys 2014; Hitchner 2008; Hodos 2010; Jennings 2011).

Another interpretive framework with a large impact on the current relational buzz in archaeology is so-called Actor-Network Theory (ANT) (Van Oyen 2014). Ethnographies of laboratory work and technological innovations led ANT to describe things and technologies as composites of relations with other things, people, places, knowledge and norms (Latour 1988, 1999; Law 1986). A technological artefact such as a computer is made to work by careful alignment of all of its internal parts that have to not only respond one to another but also through its relations to the electricity network

(to charge the battery), to the distribution outlets (to guarantee supply), to the educational system (all children learn how to work with a computer), etc. From a different angle, Nicholas Thomas (1991) coined the term 'entangled objects' to denote the processes of colonisation in the Pacific. Thomas too read objects, their meaning, and their agency as tangled up in dispersed networks, rather than representing a single identity or having a fixed role (also Dietler 2010). The previous two interpretive strands—relational personhood and globalisation—have modelled things as analytical markers for relations (things circulate and thus make and represent relations). ANT, instead, more explicitly urges archaeology to think about things as *themselves* made up of relations (Van Oyen forthcoming).

As a result, this last set of ideas has been influential in material culture studies (Knappett 2005; Knappett and Malafouris 2008; Olsen 2010; Van Oyen 2014 for discussion of archaeological applications of ANT). In direct analogy with ANT's ethnographies, so-called 'symmetrical archaeology' traces the constitutive relations of current practices of archaeological study. It draws attention to the heterogeneous practices of excavation, artefact classification, museums, etc., and in particular to how the tools and techniques used affect the kind of knowledge that is generated (Olsen *et al.* 2012; Webmoor and Witmore 2008; Witmore 2007). Carl Knappett (2005, 2011) identified the interpretive promise of ANT to complement network analysis of individual artefacts and assemblages. With the help of Peircean semiotics, Knappett describes relations between things and relations making up things. For instance, visual similarity makes a miniature vessel resonate with its 'normally' sized counterparts (Knappett 2012). And, an individual Lego motorcycle set is put together correctly through a series of physical (some parts only fit in some places) and normative (the red light goes at the back, the white one at the front) constraints (Knappett 2005: 35–62; after Norman 1998: 82–86). Ian Hodder (2011, 2012) picked up on a wide range of relational thought to develop a tailor-made framework of analysis and interpretation centred on the mutual dependencies between humans and things. 'Entanglement' traces how things rely on other things (e.g. a cup needs a saucer or a computer needs electricity), how things rely on humans (e.g. a daub wall needs to be remade on a regular basis) and how humans rely on things (e.g. I need a computer to write and distribute this paper).

There is no doubt that the relational turn—in all of its different guises—has benefited the discipline at large. It has corrected a modernist disciplinary legacy of essences and boundaries (González-Ruibal 2013), in which subject areas, analytical categories and explanatory models were built up from clearly bounded units: the social, the political, the economic, and the religious; or society and nature; or human and non-human. Relational approaches have made archaeologists realise that this is not a universally valid picture of how the world is ordered and that this is also not the most productive way of organising our evidence. Embracing relations means paving the way for more complex and textured archaeological analyses and interpretations.

Why Relations Are Not Enough

While it is hard to deny the overall benefit of relational approaches, at the same time, concerns have been voiced over the application of specific frameworks. The interpretive leap from tracing relations to identifying globalising processes and their

consequences in the pre-industrial past, for example, stirs critique (Naerebout 2006-7). Similarly, the uptake of Strathern's context-specific interpretation of Melanesian person-hood threatens to simply replace a blunt 'bounded' model of personhood with an equally uncritical 'relational' alternative (Fowler 2010). Analyses such as Strathern's should provide archaeology with *a* critical alternative to our working models, not with *the* alternative model. Is the adoption of a relational framework bound to lead us to 'find' globalisation and dividuals everywhere we look in the past? The same question phrased more cynically perhaps is whether a relational approach inevitably makes relations trivial?

Within a relational framework, stating that things (or actors, or networks) are relational is indeed *trivially true*. The problem is that relationality is taken to fulfil more roles than it reasonably can. It is often unclear whether an emphasis on relations is invoked as any or more of the following options: a methodological tool (tracing relations to answer a specific question), an ontological *a priori* (an assumption of how the world works) or a historical explanation (at a certain point in time×happened, because relations changed). If relationality is adopted as a framework through which to approach our evidence differently—whether analytically or interpretively—it cannot also be the outcome of interpretation. 'We think in terms of relations; thus, we find relations' will not do as a research design.

To avoid this circular pitfall, it is necessary to think harder about the nature of the relations described. Knappett and Hodder have again been pioneers in this regard. Knappett (2005: 85–106) has attempted to formalise the different kinds of relations in a material assemblage. Building on Peircean semiotics (Preucel 2006), he distinguishes three kinds of relations: iconic for a visual similarity (e.g. portrait and real person), indexical for a causal interrelation (e.g. footprint in the sand and walking person) and symbolic for a conventionally agreed upon relation (e.g. flag and nation state). This strategy proves very effective indeed for describing and understanding individual relations between any two artefacts or actors (e.g. Knappett 2008). So far, it seems less successful for getting to grips with the nature of assemblages as complex sets of relations. What is the interpretive value of describing an assemblage as consisting of, say, 20 % iconic relations, 30 % symbolical relations and 50 % indexical relations? Furthermore, it is likely that a single empirical relation can be, for example, both indexical and iconic at the same time.

Hodder (2011, 2012), too, has made headway in characterising the nature of the relations he describes. As explained in the previous section, his model of entanglement draws relations of mutual dependency between humans and/or things. For example, the use of grinding stones in the Neolithic 'entangled' people and things in all sorts of new ways: It facilitated the retrieval of nutrients from plants, which in turn led to an intensified use of plants, it changed the techniques for food preparation, which in turn helped establish bread as the dietary norm, and it necessitated the procurement of heavy stones, which in turn made it rather cumbersome to move around, reducing mobility. With relations came a sort of path dependency, which Hodder terms 'entrapment'. While the notion of a temporal logic to relations is not new in and of itself, Hodder explicitly links it to a suite of interpretive and analytical relational approaches, with the aim of tackling a big historical question (the nature and consequences of the Neolithic).

A problem occurs, however, when entanglement is used not only as an analytical and interpretive framework but also as a historically specific explanation for the Neolithic Revolution. The latter is thus reframed as an increasing entanglement, with

people becoming more and more dependent on things and the other way round—people being increasingly drawn into things' needs, for instance for maintenance. But then, the whole of history would become a simple linear story of increasing entanglement, increasing dependency of people and things. Moreover, there would be no yardstick for drawing out comparisons and specificities within that history, other than a simple measure of 'more or less relations'. This is not unlike the trap globalisation-themed studies often run into: In order to decide whether a period, area or phenomenon qualifies as 'globalised', one needs to define a threshold for the density of relations (how many relations does one need, and how densely should they occur, in order to speak of 'globalisation'?).

Formal network analysis has a number of measures in its toolbox to differentiate between different kinds of relations in a single network. Graphs can often indicate some of these differences visually, such as direction (arrow) and frequency (line thickness) of a single relation. But importantly, network analysis has also described a number of 'type' networks. In a small-world network, for instance, relations are organised in such a way that most nodes are not directly related but are connected to any other node through a limited number of intermediate steps (Watts and Strogatz 1998). A scale-free network, like the World Wide Web, is characterised by a number of 'hubs', nodes with significantly more connections than average (Barabási and Albert 1999; Barabási and Bonabeau 2003). This organisation has direct consequences for the network's stability and for how it can change. Such type networks describe not just different kinds of *individual* relations but different ways in which *sets* of relations are ordered, or, as I will call it, different *relational constellations*.

So far, however, the more interpretive relational approaches—in particular within material culture studies—have not come up with an equivalent that goes beyond characterising individual relations. Strathern's dividuals could count as such an equivalent, if taken for what it is: one kind of relational constellation. The challenge is to identify other such constellations, their defining characteristics, and their historical consequences.

Relational Constellations in Theory

Material Practices

How to imagine other such relational constellations? The starting point for all interpretive relational frameworks discussed above has been a practice-based approach. Post-structuralist practice theory as developed by Bourdieu (1977), Giddens (1984) or Foucault (1975) has been very influential in shaping debates on agency in archaeology (Dobres and Robb 2000; Dornan 2002). This proved compatible with the notion of relationality shared by all of the above interpretive approaches: Thinking in terms of relations emphasises variability and context-dependence over essences and fixed (read: structuralist) interpretations (e.g. Hutson 2010 for an archaeological case study linking relationality and practice theory). Meaning is not predefined but crafted *in the doing*, through practice, by situated agents (with a Bourdieusian 'habitus' or a Giddensian 'practical consciousness'), who reproduce the structure within which this meaning can be read. Meaning is not intrinsic to any object, agent or situation but is played out through the relations of similarity and difference resulting from practice. By redirecting

'meaning' from conscious meaning-giving agents to the patterning of practice, practice theory made it archaeologically accessible. As Bourdieu (1977: 79) has it, '[i]t is because subjects do not, strictly speaking, know what they are doing that what they do has more meaning than they know'. Abandoning the quest for 'meaning-in-their-heads', archaeology could build on a variety of tried-and-tested methods to retrieve context-dependent practices (Dobres and Robb 2005): *chaîne opératoire* approaches (Dobres 2000; Dobres and Hoffman 1994; Edmonds 1990; Schlanger 1994), behavioural chains (Skibo and Schiffer 2008), contextual analyses (Hodder and Hutson 2003: 170-187), etc.

This is not the place for an exhaustive theoretical critique of practice theory (see Baber 1991; Smith 2001; Throop and Murphy 2002). Aside from emphasising its compatibility with relational thought, this paper needs to point out two problems that need remedying. First, while practice theory places *analytical* emphasis on practice, action or doing, *interpretation* pushes beyond that (archaeologically) observable level to another level of meaning (Latour 2005: 102, 169 and *passim*; Schinkel 2007). This interpretive move, which effectively calls into existence a 'social' level hovering above reality and containing social explanations, has been critiqued by Latour (1999, 2005; Schinkel 2007) and by Science and Technology Studies (STS) at large (of which ANT is a part). STS is relational, like practice theory—in that it denies essences—and similarly starts from practice—so that archaeology's toolbox can be used. But for STS, both analysis *and* interpretation need to stay at the level of practice. The real relations of similarity and difference that shape the world are already there, in the doing, and not in some meta-level of meaning (see Mol and Law 1994; Law and Mol 2001; Law and Singleton 2005).

Consider Annemarie Mol's (2002) fascinating analysis of the disease of atherosclerosis. Mol observed differences in the practices of analysis of this disease in different contextual settings in a hospital: in a consulting room where the patient was asked questions and her body could be examined, under the microscope with a sample section of the arteries, or in the operating room when a surgeon opened up the arteries. These differences in practice are not just attributable to and structuring different meanings—they cannot be reduced to a different habitus of 'surgeons' versus 'general practitioners' for instance. Instead, the different settings shape different definitions of a single disease, based on different parameters, and with very practical consequences for action. The different definitions of atherosclerosis in its different settings might for instance set incompatible thresholds for the identification of the disease, or conflicting standards for treatment (Mol 2002: 72–77 and 87–108). 'Pain when walking more than ten meters' (in the consulting room) may well turn out *not* to coincide with 'more than 50 % obstruction of the artery' (under the microscope). The consequences for action created by these practical differences go beyond different meanings; they make or *structure* reality in a very matter-of-fact way.

The second problem with post-structuralist practice theory is its use of a common-sense template of material culture as 'passive objects' (e.g. Giddens 1979: 150). While the emphasis on relationality and situatedness has led practice theory to acknowledge the 'material conditions of social life' (Dobres and Robb 2000: 8), this remains a backdrop to purely human-centred practices. This problem ties in with the first one: A concern with meaning leads to a focus on human agents as giving and interpreting meaning. If, instead, agency is defined as shaping the possibilities for action—as in Mol's (2002) account of atherosclerosis—then, things can have agency too. The microscope in the laboratory, the presence of the patient's body during surgery and the stethoscope during physical examination actively shape practices and their relations

of similarity and difference. They are not just props for different groups to project different meanings onto (as in Bourdieu's (1979) *La distinction*), depending on the context and their respective habitus.

Things as Relations

Archaeology can thus continue to use its methods for analysing practice (e.g. *chaîne opératoire*), but its interpretation is brought 'down to earth', and objects become not just means for, but sources of, action. Before continuing, it is important to halt and draw out a key difference between such practice-based interpretive relational frameworks and formal network approaches (for a more detailed comparison with formal network concepts, see Van Oyen forthcoming). In general, the latter start by defining categories, entities or agents, and then draw variable links or connections between them, based on shared traits (e.g. same nationality, same gender, same web-page visited). In practice-based perspectives—and in particular Actor-Network Theory—what the categories, entities and agents are and how they are defined (e.g. how atherosclerosis is defined in the example above; or how subjects are defined (Hutson 2010)) are the outcome of a relational analysis, not the starting point.

In practical terms, this difference in research questions and *a priori*'s between formal and interpretive relational frameworks creates a different scope for the role of objects, and more generally, for material culture studies. In formal network analyses, things are used to tell us about past relations. The atherosclerosis example above, instead, has shown that things (e.g. the disease 'atherosclerosis') are also themselves (re-)defined through the relations they are tangled up with in practice.

The atherosclerosis example already hinted at how this insight leads to things' defining relations shaping their agency (the possibilities for action they set). This can be compared to the notion of affordance as the 'potentialities held by an object for a particular set of actions' (Knappett 2005: 45; Gibson 1979; Ingold 2000). Consider a bright green grass meadow. This will afford grazing to a flock of sheep. It is less likely to do so to a young human couple strolling by. The latter might be invited to lie down, especially if the weather is nice. Affordances do not distinguish between 'physical' and 'social' aspects of things. Most importantly, they describe material agency as relational: a thing's possibilities for action are defined in relation *to* something (e.g. grass is edible *for* sheep). Moreover, these relations are shaped by the contingencies of practice: Grass does not by definition tempt a couple to lie down, but it might do so if the weather is nice, if they are in a good mood, etc.

The relational constellations in this paper thus describe things and their agency. This agency is structured by the relations articulated by the material practices in which these things were enrolled—in the case studies below, the material practices of production, analysed via a loose *chaîne opératoire* approach. Because of their defining link to practice, relational constellations are emergent. As such, they force the analyst to go back to the generative processes leading to their emergence, in contrast to formal network concepts, which often describe *post hoc* 'states', not processes.

Material Agency and Historical Trajectories

Different relational constellations—defined in practice—will thus come with a different material agency, creating different possibilities and parameters for action. Like practice

theory (Baber 1991: 228), this gives us a generic working mechanism, not the historically relevant insights with which to rebut the 'so what' questions raised earlier in this paper. Practice theory had to revert to a social explanation *outside* of (or above, or before) the actual relations of practice. With ANT, there is no explanatory social level over and above the relations traced analytically. But just describing actual relations will not do either. The answer to the so what question lies in characterising different relational constellations and their consequences for action, their material agency. How to go from material agency to historical agency?

Here, the notion of trajectory comes in, which I discussed elsewhere (Van Oyen 2015). Trajectories stretch the principle of relationality in time: A thing is defined by its surrounding practices at a certain point in time and place, and this definition will set possibilities for the actions that this thing can enter into, at a future point in time. The model is one of an infinitely broken down temporal sequence, of which archaeology can describe some stages.

Trajectories denote a kind of 'path dependence' (albeit with the more complex causality implicit in the above account of material agency, different from e.g. David 1985) created by particular kinds of things, defined in a certain way, as specific relational constellations. In contrast to artefact biographies (Appadurai 1986; Foster 2006; Kopytoff 1986), then, trajectories do not describe the actual events happening to (a) specific artefact(s) but a more general series of possible actions and their consequences. While losing some of the nuances implicit in the higher resolution of artefact biographies, trajectories create scope for comparisons of generative processes across chronological and geographical boundaries.

Although not the aim of this paper, it is important to flag how thinking in terms of trajectories changes the historical questions worth asking. These shift from 'who' or 'why' to 'how', with how becoming the centrepiece of a more complex model of causality than that of the intentional actor. I have explored elsewhere (Van Oyen 2015) how this shift changes the historical narratives of the Roman Empire that we can build on the basis of its most emblematic pottery (*terra sigillata*). For example, the unanswerable question of '*who* decided to change the production process?' is replaced by '*how* did technological changes redefine the products and endow them with different material agency?'. Or, in consumption contexts, the question of 'who selected this particular pot and what did it mean?' morphs into 'what made this pot select-able for this context?'. While relational constellations and their material and historical agency thus build on the achievements of practice theory, they avoid creating a separate layer of meaning over and above practice that is difficult of access.

Relational Constellations and Their Historical Consequences

To sum up the theoretical argument so far, the relational constellations of things are defined in practice and shape future actions involving those things, cumulatively adding up to a particular historical trajectory. In contrast to post-structuralist practice theory, relational constellations hold their own explanation in them, not just in the fact that they are constituted relationally but in how their constitutive relations line up.

For example, Mol and Law (1994) discuss how the relations of a single disease, anaemia, are ordered differently in different settings, much like the example of

atherosclerosis discussed above. The various orderings, in turn, have distinct consequences for how similarity and difference are defined and for how action can proceed. Sometimes sharp differences are set up between the 'same' diseases. In the Netherlands, anaemia is only a minor issue flying low on the medical radar. This is literally and metaphorically *miles apart* from anaemia in tropical Africa, where it is a fundamental health problem. As such international health surveys, for instance, establish a sharp boundary maintained by an either/or relation: either a case of anaemia is charted as 'exceptional' (in the Netherlands) or it is amalgamated in the statistics with many other cases (in tropical Africa). The actions spurred by both cases are completely different, shaping a different trajectory. In laboratory settings, instead, anaemia is measured by skilled researchers and defined as a calibrated norm. Use of the same equipment and staff trained according to the same principles means that anaemia measured in a lab in the Netherlands becomes comparable to anaemia measured in a lab in, say, Korea. The relational constellation enacted in laboratory practices creates comparability. But makeshift field hospitals in tropical Africa do not include laboratories. Here, both the methods and outcomes of diagnosis are variable.

In some constellations, relations are bounded, but not in others. In other constellations, relations are lined up in such a way as to make them comparable. Instead of boundaries or comparability, variability can act as the defining feature of yet other constellations. The key, as with the examples of atherosclerosis and anaemia, is to trace relations through practice. The case studies below will focus on practices of ceramic fine ware production in the Roman period (Fig. 1). A loose *chaîne opératoire* (Dobres 2000; Dobres and Hoffman 1994; Edmonds 1990; Schlanger 1994) or behavioural chain (Skibo and Schiffer 2008) approach can chart the latitude of variation within production practices. Do the relations within and between production sequences align closely or not? Are they ordered randomly or not? Do they have a single reference point? Such questions will help describe the specificity of the relational constellations and their consequences.

The three constellations described below are respectively termed 'fluid', 'categorical', and 'rooted'. The fluid constellation emerges from a production sequence which maintains gradual and variable differences to other sequences. Its fluidity creates space for manoeuvre, adaptation and negotiation in action. The categorical constellation is internally homogeneous, with limited latitude of variation in technological choices, and entirely distinct from other production sequences. It facilitates comparability, competition and generalised consumption. Production of the rooted constellation, finally, is anchored in a local knowledge base. As a result, rooted things are preferentially targeted to actions within the remit of personalised choices and relations.

The Fluid Constellation

The first production sequence under study is that of the so-called 'South-Gaulish pre-sigillata'. These fine wares were produced in a series of small sites in southwest Mediterranean France in the last decades of the first century BC (Passelac 1986, 1992; Fig. 1). Workshops produced the pots that we call 'pre-sigillata' today alongside a wide range of fine and coarse wares and ceramic building materials (Passelac 1996). The technological choices of pre-sigillata production set it apart both from other products from the same workshops and from preceding kinds of locally produced ceramics. Most strikingly, new forms were adopted, borrowed from a new, Italian fine ware repertoire
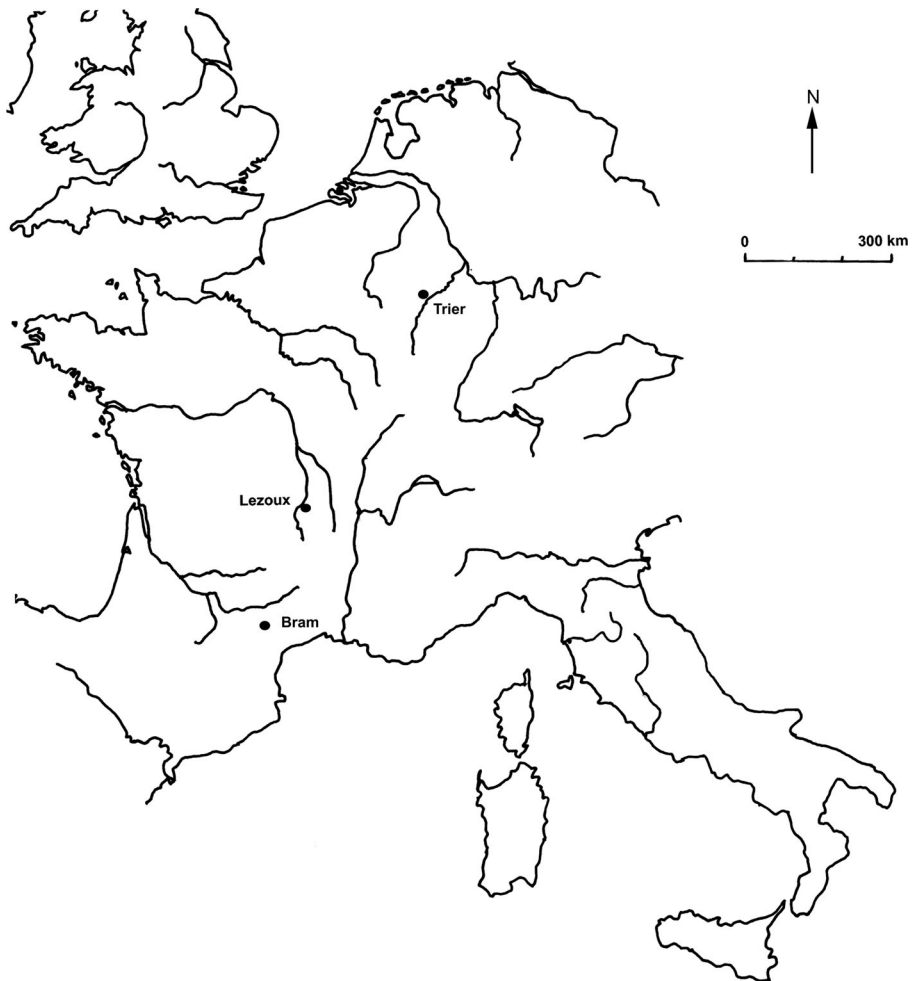
Fig. 1 Map locating the respective main production sites of first century BC pre-sigillata (Bram), second century AD terra sigillata (Lezoux) and third century AD Rhenish wares (Trier) discussed in this article

(Fig. 2). A new practice of stamping the inside of the vessel base was introduced. Pots with a reddish exterior colour were now produced alongside the more traditional local grey wares. And pre-sigillata pots used a different kind of clay that was calcareous.

But at the same time, the pre-sigillata pots were never really dissociated from other preceding and contemporary ceramic products. Kiln technology and firing mode remained unaltered (Passelac 2001). As such, the addition of a new surface colour (red alongside grey or black) merely explored a new possibility within traditional channels of knowledge. The use of calcareous fabrics was new, but the actual CaO content of these fabrics was highly variable (Picon 2002). As a consequence, in practice, there was not actually a clear-cut threshold that separated the calcareous clays of pre-sigillata from the non-calcareous clays used for other kinds of pottery. Moreover, not only new forms but also some forms with a long local production history were produced in calcareous fabrics (Martin 2005; Fig. 2). Finally, while stamping was a
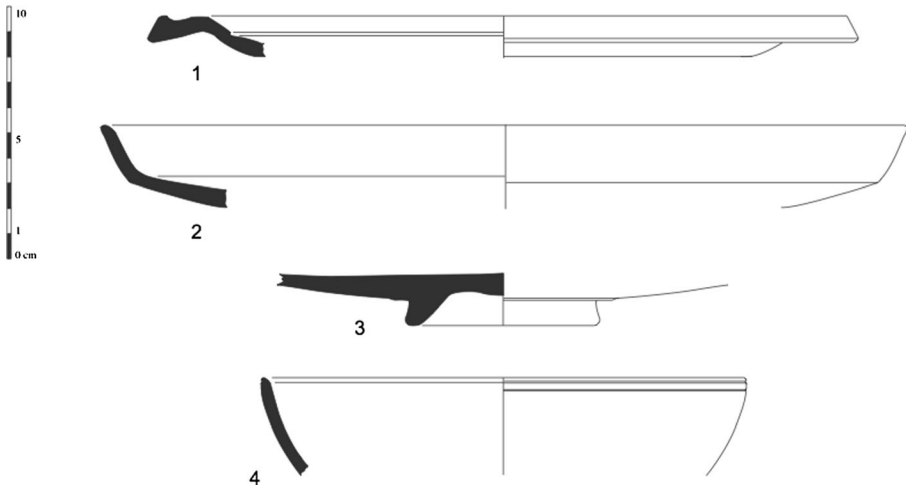
Fig. 2 Some pre-sigillata forms produced at Bram, inspired by an Italian (*1–3*) and local (*4*) repertoire (drawings by M. Passelac, CNRS)

new practice, its frequency remained very limited, and the way it was done differed from its Italian models (e.g. few epigraphic stamps).

The relations of the pre-sigillata production process did not neatly line up with one another. During some stages in the production process, pre-sigillata pots were differentiated both from preceding local pots and from other contemporary ceramic products. This differentiation, however, never entirely cut the ties with those other production sequences, and other stages in the pre-sigillata production process maintained similarity. Taken by itself, moreover, the production process of pre-sigillata pots was characterised by a large latitude of variation. Technological choices were never identical between one pre-sigillata pot and another. But at the same time, they always remained connected.

Elsewhere, I have characterised this relational constellation as a fluid (Van Oyen 2013a). In this instance, I borrowed the terminology from Mol and Law (1994: 658, emphasis omitted), who define a fluid by the occurrence of 'variation without boundaries and transformation without discontinuity'. Pre-sigillata production qualifies as a fluid relational constellation in that it did not put up fixed boundaries, neither between pre-sigillata pots and other ceramics nor between pre-sigillata pots themselves. This does not mean that there were no differences in production. Rather, these differences were gradual and variable, so that the production sequences of different ceramic products as it were 'flowed' into one another.

It is important to pause and draw out the difference with formal relational approaches. As discussed above and elsewhere (Van Oyen forthcoming), by necessity these subject practice to categories. Put differently, the analytical categories from which formal relational approaches start are always 'already made'; the practices through which they emerged and were defined are filtered out (see Butts 2009; Knox *et al.* 2006). This means that the nature of those categories needs to be decided *a priori*. This choice tends to align with standard practices of processing material culture in archaeology (excavation and processing practices, labelling, typologies) in defining the categories as homogeneous and clearly separate one from another (this is what I will call a categorical constellation below). Building upon a *chaîne opératoire* approach,

instead, makes it possible to analyse practices before pinning down the nature of the categories we work with (or their relational constellation). As a result, it becomes clear that South Gaulish pre-sigillata was not defined as bounded and homogeneous but as a fluid constellation. Formal relational analyses thus threaten to neglect or misrepresent the variety of material culture constellations by strictly taking things as *post hoc* evidence for relations, not as themselves emergently defined through relations.

But, describing relational constellations is not an end in itself. Remember that we are trying to answer the so what question of relational approaches. If identifying relations has become a trivial end point within a relational framework, then identifying the way in which these relations are ordered only goes halfway. A real answer to the so what question needs to historicise the relational constellation and its agency. The historical context was marked by the Roman colonisation of South Gaul. Building on the region's long history of contacts with foreign traders, the formal process of colonisation had begun almost a century before pre-sigillata production started off (Goudineau 1978; Dietler 2010). As such, pre-sigillata pottery tends to be implicated—implicitly or explicitly—in various interpretations of this colonial process. Did colonisation trigger a sharp cultural distinction between 'newcomers' and 'natives'? Were new technologies imposed on the native population? Did they meet with resistance at all?

At this point, the difference with post-structuralist practice theory becomes clearer. With practice theory, this is when an interpretive level of social meaning, different from practice, is called upon. The historical questions, seeking to access this explanatory level, focus on who and why: Who imposed a new technology, and with what meaning, who chose to consume 'Italian'-looking pots, and what did this choice reflect? In the resultant historical narratives, agency lies squarely with decision-making human agents.

The approach taken in this paper, instead, grants material agency to the relational constellation itself, in creating practical consequences for action. As such, things as relational constellations shape a trajectory of actions that, in itself, is 'history'. The historical question, then, centres on the specificity of the historical trajectory of pre-sigillata pottery as a fluid constellation. As described above, pre-sigillata production was defined by irregular variability, not by repeated, sharp boundaries (Passelac 1992; Van Oyen 2013a). It maintained relations both to older ways of doing and to newly introduced technologies, but these did not collide or cause any conflict.

As a fluid constellation, pre-sigillata pottery created space for manoeuvre and adaptation in action (Law and Singleton 2005). Producing or using pre-sigillata pots happened alongside other pottery (e.g. Martin 2005), whether this other pottery was marked out as 'new' or 'old'. Regardless of the associations made by the producer or consumer, pre-sigillata pots could always be read as new or Italian as well as 'traditional' or 'local', because they fitted the associated practices of both of these value systems. The absence of sharp boundaries in how pre-sigillata pottery was defined, and its variability and large latitude of variation worked through inclusion rather than exclusion. Pre-sigillata pottery did not exist as a separate, autonomous category in the context of production, and its production practices traced a variety of relations to different sources and other production sequences. As an upshot of this, pre-sigillata production was not an area of practice in which plain statements about identity, 'localness' or 'Roman-ness' could be made. Instead, it triggered the kinds of ambivalent messages that post-colonial archaeology has so aptly described (Van Oyen 2013a).

Because of its fluid constellation, the traits of pre-sigillata pottery were continuously changing. Nevertheless, this change was 'non-marked' (de Laet and Mol 2000), in that it did not play out against a clear-cut boundary of 'what does (not) count as pre-sigillata'. Empirically noticeable for the analyst, this change did not lend itself to meaning-laden ruptures. Instead, it allowed for a subtle socio-cultural negotiation, in which skills, forms and knowledge were reworked but not obliterated or denied.

A more detailed description of pre-sigillata distribution and consumption practices would be needed to fully trace how its material agency as a fluid constellation shaped a particular historical trajectory. But, the account so far should suffice to bring across the general methodological and theoretical goal of this article. In relation to the colonial encounter in South Gaul discussed here, it shows that material culture did not just signal pre-existing social values. Rather, it actively facilitated them, by lending itself to certain kinds of actions and not to others. This facilitating role was not just a factor of its being 'material' or relational but of it being defined through particular kinds of relations—in this case as a fluid relational constellation. While pre-sigillata pottery is of course only one item of material culture among the large repertoire of the time and region, this example does give an indication both of the method (how thinking about relational constellations goes beyond saying that things are relational) and of the historical tendency of trajectories (more subtle negotiations than clear-cut dichotomies in the case of a fluid constellation).

The Categorical Constellation

With the second production sequence under study, we fast-forward to the second century AD. So-called 'terra sigillata' pottery was then mainly produced at the site of Lezoux in Central Gaul (Brulet *et al.* 2010: 92–125; Fig. 1). As with pre-sigillata, workshops at Lezoux produced terra sigillata fine wares alongside other ceramic products. But in the case of the terra sigillata production sequence, the relations enacted in the production practices lined up rather differently.

First of all, the relations between the terra sigillata production sequence and that of other contemporary ceramic products maintained a marked distinction. From the second century AD onwards, terra sigillata pottery was fired in a specialised type of kiln that created a unique, oxidising firing atmosphere (Bet *et al.* 1994; Picon 1973). This guaranteed a distinct shiny, bright red exterior surface (Fig. 3). Both practically and visually then, terra sigillata was clearly separated from other pottery types. Its clays were strictly calcareous, without any chance of overlap with the clays used for other ceramics. This distinction could be maintained because the variability in CaO content for sigillata clays was much reduced in comparison to the pre-sigillata clays. As an upshot of this, the entire production sequence of terra sigillata—from fetching clay to firing pots—was now disconnected from those of other pots. The tasks of fetching clay for terra sigillata and other ceramics could not be combined because their respective clays were to be found in different localities. Similarly, their firing was mutually exclusive because different kiln infrastructures were needed.

Terra sigillata production practices were not only marked by a sharp external boundary separating them from other production sequences but were also internally homogeneous. All of terra sigillata production's technological choices had a narrow latitude of variation. I have already mentioned that the levels of CaO content were not

Fig. 3 Terra sigillata bowl produced at Lezoux in the second century AD (photo by R. Delage)

very variable. Similarly, firing temperatures were very high and consistent (Picon 1973). The range of forms was limited, with each form occurring in a series of standardised size modules (Bet and Delor 2000; Monteil 2012). In addition, the production of moulds for decoration became increasingly centralised, resulting in recurrent decorative schemes.

All of these features of terra sigillata production practice at second century AD Lezoux have led me to describe its relational constellation as categorical: externally bounded and internally homogeneous (Van Oyen 2015 and forthcoming). As a relational constellation, the category is defined by its marked difference from other things. Its internal homogeneity and its external boundary are mutually reinforcing. A good test to identify a category is to ask the 'either/or' question: Either a random pot belonged to the terra sigillata category or it did not. There were no grey zones in between; there was no ambiguity or freedom of interpretation in its production.

Let me stress once more the difference with formal relational analyses. The latter assume the 'category' as a neutral analytical template for all material culture (cf. Van Oyen forthcoming). This *a priori* assumption not only threatens to misrepresent non-categories (e.g. the fluid constellation described in the previous section) but also deprives actual categorical constellations—like terra sigillata—of their specific historical agency. The pay-off of describing the relational constellation of terra sigillata production again lies in its historical consequences (Van Oyen 2015 for a more detailed discussion of the trajectory described in the following paragraphs).

The limited latitude of variation of the terra sigillata category facilitated abstraction of the final products from the local contingencies of who they were produced by, where, etc. Questions such as how pots should be made, with which types of clays, or what they should look like receded to the background. This made the final products—the finished pots—more readily comparable: One could compare any two terra sigillata pots based on any trait of their standardised package (e.g. 'how shiny is the shiny slip', 'which form was used from the standard repertoire'). This comparability in turn increased the scope for competition—a phenomenon noticeable in second century

AD Lezoux by a number of increasingly popular forms (Brulet *et al.* 2010: 124) and by 'branding' of workshops through the use of large, exterior name stamps (Delage 2004).

At the same time, the clearly defined boundary delimiting 'what counts as terra sigillata production' made it difficult to reproduce these pots. Technological choices had to fall within a very narrow range, disqualifying experimentation. The result was a fairly centralised production landscape, with a few larger sites exporting products over long distances (Delage 1998). On the consumption end, terra sigillata came in as a bounded constellation, without obvious external relations or references. This increased its flexibility: It made no *a priori* claims as to its appropriate usage or semantic associations. As a consequence, terra sigillata spread densely and widely in the second century AD, being used in all sorts of consumption practices—dining, rituals, funerary, etc.—and on all kinds of sites (Willis 2005).

By the second century AD, the Roman Empire was firmly established in the western provinces, reaching its maximum extent. Practice-based approaches of post-structuralist lineage would try and find the social meaning behind the dense and widespread carpet of terra sigillata pots throughout these provinces. As pointed out in the preceding case study, this results in a search for the who and the why as historical agents (e.g. 'who decided to buy into the Roman empire by using terra sigillata pottery and why', or 'what meaning did these pots signal – Roman? Local prestige?'). Instead, the material agency of terra sigillata as a categorical constellation triggered certain consequences for action—competition, centralised production and generalised consumption without specific associations—that would have generated and supported some of the structural principles of a stabilised Roman empire. Power was centralised but reached widely, much like the interplay between the centralised terra sigillata production landscape and its long-distance export. Moreover, a striking material homogeneity characterised the Western Roman Empire but did not preclude varying interpretations and local meanings. As a categorical constellation, terra sigillata created and maintained such a material homogeneity, which was flexible enough not to dictate associations or patterns of usage.

The Rooted Constellation

A final case under study in this article is the production of so-called 'Rhenish wares' in third century AD Trier (East Gaul; Fig. 1). Rhenish wares were fine wares with a generally dark surface, whose form repertoire largely focused on drinking vessels. Rhenish ware production lacked the internal homogeneity of terra sigillata's categorical constellation. And, the significant latitude of variation of their production sequences was ordered differently than that characterising the fluid constellation of pre-sigillata production. Variability in Rhenish wares' technological choices was not randomly distributed across all possible options as was the case for pre-sigillata production. Instead, for each technological choice, a preferential option existed against the background of a wide tail of acceptable alternatives. And in sharp contrast to the multiple reference points of pre-sigillata production (previous production sequences, Italian imports, ceramic products other than fine wares, etc.), those preferential options closely tied Rhenish ware production to a single reference point: Trier, the locus of production.

The dominant option for Rhenish ware shapes, for instance, consisted of drinking forms. Beakers would have served to drink locally produced products, as from the third century AD onwards, Trier boasted not only its own beer production but also vineyards

along the Mosel (Luik 2001). Nevertheless, this preference for drinking forms with local ties did not preclude production of other shapes geared towards dining or ornamental functions (Künzl 1997). This variability served to reinforce the aspect of a targeted and personalised choice that characterised the dominant options in the production sequence of Rhenish wares (e.g. drinking forms). The tension between background variability and dominant choice was continued throughout the production process. Of the 28 vessel forms distinguished by Symonds (1992), a single beaker type accounts for over half of the total recorded vessels. But, variations occurred within a single vessel form (Fig. 4), and the same form could be rendered in various sizes, from miniature to extra large examples. A similar pattern can be noted for decoration: The barbotine technique with white slip trails dominated, but many other possibilities existed (painting, appliqué, drawing). The dominant choice of barbotine, however, again writ the physical and local dimensions of Rhenish ware production large. Barbotine trailing directly showed the handcraft of the decorator. Moreover, a subset of beakers with barbotine decoration carried short Latin mottoes, underscoring a personalised relation between potter and user. Some such mottoes contained references or puns relating to the local events in and around Trier (e.g. involving the locally stationed army officers; Künzl 1997: 95).

To repeat, against the background of the many and variable relations and the flexibility of the production process, one kind of relation dominated. This was a relation to Trier as an experienced and conceptual locality, as the place where the pots were preferentially produced and used. For these reasons, the relational constellation of Rhenish ware production practices in third century AD Trier can be termed rooted. The constellation was anchored in, and defined by, the physicality of the production process and the locality of the production site. A targeted and personalised relation rooted the various technological choices of Rhenish ware production. The fact that this 'rooting' occurred against a background of variability only served to heighten the sense of targeted choice associated with the dominant technological options (e.g. drinking forms, barbotine decoration).

Other indicators of this rooted constellation abound in Rhenish ware production. The fabric of the Trier Rhenish wares, for example, is characterised by a unique 'sandwich effect' (Bocquet 1999; Brulet et al. 2010: 352), attesting not only to special care and skill in firing but also to locally shared knowledge. Proportionally, many vessels have traces of fingerprints on their external slips, illustrating that indicators of bodily manipulation in the production of the vessels were acceptable.

Of the three relational constellations described in this paper, the rooted constellation is the one bearing most direct resemblance with a well-known formal network type—the scale-free network. From the Internet to cell biology and collaboration in the academic world, many networks in daily life are 'scale-free': New nodes preferentially
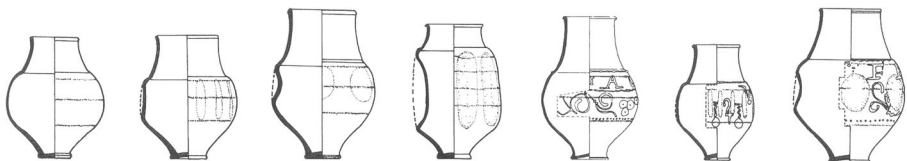

Fig. 4 Some variations on the main beaker type (Symonds 1) of third century AD Rhenish wares produced at Trier, scale 1:4 (adapted from Vilvorder 1999: 98, Fig. 13)

attach to existing nodes with more than average connections (Barabási and Albert 1999; Barabási and Bonabeau 2003). The resulting network is one where almost all pathways through the network pass through a few highly connected nodes (hubs). While in the rooted constellation of Rhenish wares, Trier could arguably be such a hub triggering preferential attachment, the general conceptual difference between formal network analysis and relational constellations remains. When Barabási and Bonabeau (2003: 52) for instance describe the scale-free network as 'a strict architecture, ruled by fundamental laws', their concern is not with where these 'laws' come from, what they consist of, and how they are maintained. These questions, instead, are keys to relational constellations, which replace laws by contingent, situated practices.

Nevertheless, such contingent practices shaped what Rhenish wares could do, thus projecting the constellation's agency in time and space, beyond their contingency. As signalled at the start of this paper, formal network approaches have been pioneering in thinking about the consequences of particular type networks. The scale-free network, for example, is resilient to random 'attacks' but highly vulnerable to threats targeting the hubs. The potential consequences for designing a virus or for avoiding the spread of an epidemic are obvious. But, imagine a virus itself becoming reconfigured— redefined—through its circulation in a scale-free network. It could then take on some of the network properties and transfer them to other contexts. In contrast to network types, relational constellations describe things themselves and the *emergent* properties they take on as a result of being enrolled in particular practices. Their materiality and portability means that things are key in transferring the consequences of defining relations even when they leave the original context of practice. This is where the notion of trajectory comes in, introduced above and set to work in the previous examples. Rhenish wares *themselves* were defined as a rooted constellation, through their relation with the skills and practices associated with Trier. What matters is again that this constellation came with specific historical consequences. These rely on the fact that Rhenish wares, defined as a rooted constellation in production, took this constellation's consequences outside of its generative context of production.

How did the rooted constellation of Rhenish wares project its consequences beyond the immediate context of production, shaping patterns of distribution and consumption? Firstly, the most elaborate examples of Rhenish wares in both form and decoration are found in and near Trier itself (Brulet *et al.* 1999: 408; Oelmann 1914: 36–37). This attests to the absence of global norms as to 'what was appropriate in consumption' and possibly hints at direct and personalised production to order. In any case, it emphasises that consumption of Trier Rhenish wares was locally anchored, just like their production. Secondly, the important town of Lyon has an exceptionally high concentration of Trier Rhenish ware beakers, while the intermediate regions received fairly limited supplies. This can be linked to the social, political and administrative relations between both towns—epitomised by the inscriptions of traders from Trier residing in Lyon (Krier 1981). Again, personalised and targeted relations prevail on the generalised or random relations characterising the categorical and fluid constellations respectively.

The two consequences discussed so far could theoretically be explained by positing a scale-free network, with Trier as one of the hubs, in which Rhenish wares circulated. Apart from the problems already pointed out (privileging a *post hoc* description over attention to generative processes), the third consequence defies the laws of the scale-free network. In stark contrast to the wide and dense carpet of terra sigillata distribution,

Rhenish wares were distributed widely but sparsely. This intersects with their consumption pattern within and beyond Trier. Both generally speaking and in the specific case of Roman Essex, Rhenish wares tend to occur preferentially in deliberate, focused actions, such as ritual or funerary contexts (Harris 1986; Willis 2005). These kinds of actions were seeking to emphasise and maintain targeted relations, to persons, places or events. Defined as a rooted constellation, Rhenish wares were ideally suited for this purpose. They took the localised and personalised relations of their production context with them—through their small numbers (which thwarted comparability), their varying sizes, the fact that they could not be piled up and their handwritten mottoes—and projected them onto the possibilities for distribution and consumption. Because Rhenish wares were preferentially consumed in specific, targeted practices, their definition brought with it a quantitative limit: Such practices only ever made up a limited range of the repertoire of action on any site (Felski 1999), and demand for Rhenish wares would be curtailed accordingly (Pollard 1988: 82; Turner 1999). Scale-free networks often, although not always, arise from a process of preferential attachment, which could be synonymous with the rooted trajectory described here. But, where a rooted constellation like 'Rhenish' wares came with a limited scope for expansion, growth is a requirement for the process of preferential attachment (Barabási and Bonabeau 2003: 55).

Every single one of these consequences for action underscores how the rooted constellation of Rhenish wares harnessed and reinforced selective connections, personalised ties and direct identification between people, places and things. The trajectory of Rhenish wares in turn helped shape the historical processes of the third century AD. By the third century AD, the power structure of the Roman Empire was increasingly dependent on the personal ties of the emperor himself. During the last quarter of the third century, Trier became the capital of the Gaulish part of the Later Empire, where the emperor and his court resided (Wightman 1970). It is no surprise to see that the rooted constellation of Rhenish wares coincides with a locality that epitomised the new, increasingly personalised and selectively connected power structure. While the historical context indirectly influenced Rhenish ware production, it also relied on particular kinds of—rooted—things for its maintenance. Things defined as rooted constellations facilitated local meaning-making and explicit framing of locally structuring actions. The possibilities for action of the things themselves, then, shaped historical trajectories, gradually pushing the homogeneous material culture of the Western Roman provinces to the background and making way for more regional differentiation in production and consumption.

Historicising Material Agency: an Answer and Many Questions

Both theoretically and methodologically, the step from tracing relations to thinking about how these relations line up in relational constellations is small. This article combines the attention to context and situated action of practice-based studies with the formal relational frameworks' concern with relational structures and their consequences. Its novelty lies in marrying these two research strands through a focus on things and their material agency. The question of why for example terra sigillata production became defined as a categorical constellation hides behind many contingent

parameters that remain poorly accessible to archaeology—the who and why questions hinted at throughout the analyses above. The case studies in this paper similarly started from the situated contingencies of production practices but accessed these via the how question, which can build on well-established archaeological methods (e.g. *chaîne opératoire*). Seeing these practices as defining *things* offers a means for analysis to break out of the initial context of production, by following these things through distribution and consumption. This shows how things hold within them certain possibilities for action and thus shape their own historical trajectories. The direction of these trajectories depends on these things' relational constellations—locally defined yet projecting outwards in time and space (Fig. 5).

Different relational constellations set different possibilities for distribution and consumption, adding up to diverging historical trajectories. For example, the dense distribution pattern of a categorical constellation (terra sigillata) was very different from the thin but wide-reaching scatter of a rooted constellation (Rhenish wares). Depending on the nature of the relational constellation, in consumption, fine wares articulated ambiguous displays of multiple and variable relations (fluid), a lack of prior associations (categorical), or very specific, targeted and personalised ties (rooted). Pulling out these differences goes beyond what charting either the nature of individual relations or the overall density of relations can tell us. For example, some of the relations which maintained pre-sigillata pottery production as a fluid constellation can be labelled iconic (e.g. overlap in shapes with other ceramics), others indexical (e.g. same firing process, and thus same sequence of cause and event in determining the exterior colour as other ceramic products) (following Knappett 2005 and Preucel 2006). But pinning down these individual relations does not have the same interpretive leverage as describing the overall constellation of relations as fluid.

By re-connecting material culture with its historical agency, relational constellations can rebut the so what questions fired at the recent buzz of relational frameworks—practice-based as well as formal—in archaeology. Relational constellations also push debate on material agency forward (Gosden 2005; Knappett and Malafouris 2008). They replace the generic credo that 'material culture is active' with insight into just *how* a specific kind of material culture created possibilities for action. And, they move discussion of material agency from direct and situated human-thing engagements (e.g. Gell 1998) to broad chronological and geographical phenomena.

Moreover, relational constellations are an important tool to guide comparative studies in archaeology. It does not make sense to ask whether a fluid has 'more or fewer' relations than a categorical constellation—this would be the proverbial comparing apples and oranges. And, one cannot just discuss 'competition' in the same way for the categorical terra sigillata (whose comparability facilitated competition and whose flexibility in consumption created an insatiable demand) and the rooted Rhenish wares (which were by

	Fluid	Categorical	Rooted
Latitude of variation (number of options per technological choice)	large	narrow	large
Distribution of variation (choice of option)	random	standardized	preferential
External relations	multiple	none, bounded	targeted, local
Agency	ambiguous	without references, easy integration	personalized

Fig. 5 Table summarising the structural characteristics and resultant agency of the relational constellations described in this article

definition not comparable one to another, and whose consumption was limited to specific practices). By building on yet moving beyond the historically situated contingencies of practice, relational constellations provide scope for cross-cultural, chronological or geographical comparisons. The aim is of course not to devise strict typologies for relational constellations of human-thing interactions. Nevertheless, the process of naming and describing constellations and their consequences increases awareness of structural parallels. Comparing terra sigillata and Coca-Cola as categorical constellations (Van Oyen 2015), for example, is more specific and thus often more meaningful than using a blunt tool such as globalisation, which is both too big and too vague to get at historical trajectories. As a flipside of this, comparisons building on relational constellations can describe differences in more detail, precisely because they start from qualitative, structural similarities. Questions such as the 'relative degree of entanglement' (or the density of relations) thus gain resonance when comparing similar relational constellations.

It has to be emphasised that relational constellations do not do away with the, perhaps more traditional, historical questions of who and why. Instead, they bring these down to the same analytical and interpretive plane as the question of how. The latter question no longer introduces a neutral descriptive background but matters historically *just as much* as 'who did something' and 'why did something happen'. Once these questions are reunited on the same plane of causality, they can start to inform one another. Relational constellations can therefore help contextualise the tools and questions of traditional history writing. For example, a question such as 'why did someone select this pot in this context' will have to refer to how this pot was defined and what possibilities its trajectory set. And, one needs to consider whether terra sigillata and 'Rhenish' ware pots had the same historical agency before inserting them in a single graph to chart e.g. economic growth (cf. the limited scope for expansion of the rooted 'Rhenish' wares).

Arguably the trajectories described in this paper could be developed in more detail, as I have done elsewhere (cf. Van Oyen 2013b, 2015). But, this article aims to be a starting point, not a conclusion. It invites others to develop detailed examples of relational constellations and their historical trajectories, with a view not only to better understand their specificity but also to be able to start exploring them comparatively. Because it does not claim to be an end point, it is appropriate to conclude this paper by flagging further questions raised by relational constellations.

First, the constellations described in this article are only three among an endless spectrum of possibilities. As mentioned above, the aim is not to typologise but to get to grips with historical trajectories and to allow for meaningful structural comparisons. In describing different constellations, it will thus be necessary to strike a pragmatic balance between splitting and lumping, to suit the research question at hand. Comparison can start from various angles. It can follow after description of the relational constellation of objects, based on practice-centred analysis. As such, relational constellations can connect with an existing tradition of work focused on craft specialisation (Costin 1991; Costin and Hagstrum 1995)—with the proviso that the constellation denotes the objects in those practices. It can start from perceived empirical similarities—for example, if different things have a similar distribution pattern, then are they necessarily similarly defined constellations? Or it can work down from apparent similarities in historical trajectories—for instance, does key material culture of empires tend to be categorically defined?

A second question requiring further research is how different relational constellations hang together. For the sake of clarity, the three examples above are derived from markedly

different timeframes and historical contexts. This may have given the false impression that there was a one-to-one relationship between the wider historical context and the human-thing relations enabling and sustaining that context. Put differently, it is not necessarily the case that all material culture in a situation of culture contact is fluid, and all human-thing relations under a stable empire are ordered as categorical. Alongside terra sigillata, for example, many other ceramic products were being produced, distributed and consumed that did not qualify as categories. Moreover, for some time, terra sigillata and Rhenish wares were being produced in the same workshops (see Van Oyen 2013b for discussion). Their interrelationship begs further examination, through more fine-grained studies crossing the boundaries of individual artefact classes and specialisations.

Thirdly, throughout this paper (and elsewhere, in more detail: Van Oyen forthcoming), I have clarified how relational constellations build on, yet differ from, post-structuralist practice-based frameworks and formal network approaches. But, more theoretical and empirical work needs to be directed at integrating different research traditions and at fleshing out their differences where needed. These different bodies of research come from different places, with widely diverging assumptions and research questions. Yet, all end up describing sets of relations and their (historical) consequences. Cursorily attempted in this paper, it would be an interesting exercise to compare the network types resulting from formal network analysis and the relational constellations derived from a practice-based approach for any given set of human-thing relations.

Conclusion

During the last decades, relational frameworks have made huge advances in archaeology. Both analytically (formal network approaches) and interpretively (human-thing relations in material culture studies), they have broken down a disciplinary bastion of essences and boundaries. But, they are increasingly vulnerable to easy critique as they threaten to reach trivial conclusions by simply 'finding' relations where the starting assumption was that the world is made up of relations. In an age without huge paradigm shifts, the most significant advances are often made by small theoretical improvements. This article has presented one such improvement: not only to trace relations between humans and things but also to characterise the way they are ordered—their constellation. This small step can be accommodated by existing practice-based methods of tracing relations, such as *chaîne opératoire* or behavioural chain approaches. The three cases developed in this article demonstrated the potential of relational constellations for explaining specific historical processes, for refining our theoretical grasp on the workings of material agency and for facilitating comparative studies in archaeology. Most importantly, perhaps, thinking in terms of relational constellations opens up an exciting territory of future research questions that is only just beginning to be charted.

References

Appadurai, A. (1986). Introduction: Commodities and the politics of value. In A. Appadurai (Ed.), *The social life of things. Commodities in cultural perspective* (pp. 1–63). Cambridge: Cambridge University Press.

Appadurai, A. (1996). *Modernity at large. Cultural dimensions of globalization*. Minneapolis: University of Minnesota Press.

Baber, Z. (1991). Beyond the structure/agency dualism: an evaluation of Giddens' theory of structuration. *Sociological Inquiry, 61*, 219–230.

Barabási, A.–. L., & Albert, R. (1999). Emergence of scaling in random networks. *Science, 286*(5439), 509–512.

Barabási, A.–. L., & Bonabeau, E. (2003). Scale-free networks. *Scientific American, 288*(5), 50–59.

Bauman, Z. (1998). *Globalization. The human consequences*. Cambridge: Polity Press.

Bet, P., & Delor, A.(2000). La typologie de la sigillée lisse de Lezoux et de la Gaule centrale du Haut-Empire: Révision décennale. *SFECAG Actes du congrès de Libourne,* 461–484.

Bet, P., Delage, R., & Vernhet, A. (1994). Lezoux et Millau: Confrontation d'idées et de données. *SFECAG Actes du congrès de Millau,* 43–61.

Bocquet, A. (1999). La production et la distribution des céramiques fines engobées et métallescentes dans le nord de la Gaule: Approche minéralogique et géochimique. In R. Brulet, R. P. Symonds, & F. Vilvorder (Eds.), *Céramiques engobées et métallescentes gallo-romaines. Actes du colloque organisé à Louvain-la-Neuve le 18 mars 1995 (Rei Cretariae Romanae Fautorum Acta Supplementum8)* (pp. 129–286). Oxford: RCRF.

Bourdieu, P. (1977).*Outline of a theory of practice* (*Cambridge Studies in Social Anthropology 16*) (trans: Nice, R.). Cambridge: Cambridge University Press.

Bourdieu, P. (1979). *La distinction. Critique sociale du jugement*. Paris: Minuit.

Brück, J. (2001). Monuments, power and personhood in the British Neolithic. *Journal of the Royal Anthropological Institute, 7*, 649–667.

Brughmans, T. (2010). Connecting the dots: towards archaeological network analysis. *Oxford Journal of Archaeology, 29*(3), 277–303.

Brughmans, T. (2013). Thinking through networks: a review of formal network methods in archaeology. *Journal of Archaeological Method and Theory, 20*(4), 623–662.

Brulet, R., Symonds, R. P., & Vilvorder, F. (Eds.). (1999). *Céramiques engobées et métallescentes gallo-romaines. Actes du colloque organisé à Louvain-la-Neuve le 18 mars 1995 (Rei Cretariae Romanae Fautorum Acta Supplementum8)*. Oxford: RCRF.

Brulet, R., Vilvorder, F., & Delage, R. (Eds.). (2010). *La céramique romaine en Gaule du Nord. Dictionnaire des céramiques. La vaisselle à large diffusion*. Turnhout: Brepols.

Butts, C. T. (2009). Revisiting the foundations of network analysis. *Science, 325*, 414–416.

Collar, A. C. F. (2007). Network theory and religious innovation. *Mediterranean Historical Review, 22*(1), 149–162.

Costin, C. L. (1991). Craft specialization: issues in defining, documenting, and explaining the organisation of production. *Journal of Archaeological Method and Theory, 3*(1), 1–56.

Costin, C. L., & Hagstrum, M. (1995). Standardisation, labor investment, skill, and the organization of ceramic production in late pre-Hispanic highland Peru. *American Antiquity, 60*(4), 619–639.

David, P. A. (1985). Clio and the economics of QWERTY. *American Economic Review, 75*(2), 332–337.

de Laet, M., & Mol, A. (2000). The Zimbabwe Bush Pump: mechanics of a fluid technology. *Social Studies of Science, 30*(2), 225–263.

Delage, R. (1998). Première approche de la diffusion des céramiques sigillées du centre de la Gaule en occident romain. *SFECAG Actes du congrès d'Istres,* 271–313.

Delage, R. (2004). L'écrit en "représentation": les marques de grand format au sein des décors sur sigillée du Centre de la Gaule. *Gallia, 61*, 145–152.

Dietler, M. (2010). *Archaeologies of colonialism. Consumption, entanglement, and violence in ancient Mediterranean France*. Berkeley: University of California Press.

Dobres, M.-A. (2000). *Technology and social agency. Outlining a practice framework for archaeology*. Oxford: Blackwell.

Dobres, M.-A., & Hoffman, C. R. (1994). Social agency and the dynamics of prehistoric technology. *Journal of Archaeological Method and Theory, 1*(3), 211–258.

Dobres, M.-A., & Robb, J. E. (2000). Agency in archaeology: Paradigm or platitude? In M.-A. Dobres & J. E. Robb (Eds.), *Agency in archaeology* (pp. 3–17). London-New York: Routledge.

Dobres, M.-A., & Robb, J. E. (2005). "Doing" agency: introductory remarks on methodology. *Journal of Archaeological Method and Theory, 12*(3), 159–166.

Dornan, J. L. (2002). Agency and archaeology: past, present, and future directions. *Journal of Archaeological Method and Theory, 9*(4), 303–329.

Edmonds, M. (1990). Description, understanding and the *chaîne opératoire. Archaeological Review from Cambridge, 9*(1), 55–70.

Felski, R. (1999). The invention of everyday life. *New Formations, 39*, 15–31.

Foster, R. J. (2006). Tracking globalization: Commodities and value in motion. In C. Tilley et al. (Eds.), *Handbook of material culture* (pp. 285–302). London: SAGE.

Foucault, M. (1975). *Surveiller et Punir. Naissance de la Prison*. Paris: Gallimard.

Fowler, C. (2004). *The archaeology of personhood*. London: Routledge.

Fowler, C. (2010). From identity and material culture to personhood and materiality. In D. Hicks & M. C. Beaudry (Eds.), *The Oxford handbook of material culture studies* (pp. 352–385). Oxford: Oxford University Press.

Freeman, L. C. (2004). *The development of social network analysis*. Vancouver: Empirical Press.

Gell, A. (1998). *Art and agency. An anthropological theory*. Oxford: Clarendon.

Gibson, J.J. (1979). *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.

Giddens, A. (1979). *Central problems in social theory. Action, structure and contradiction in social analysis*. London: Macmillan.

Giddens, A. (1984). *The Constitution of Society. Outline of the theory of structuration*. Cambridge: Polity Press.

González-Ruibal, A. (Ed.). (2013). *Reclaiming archaeology. Beyond the tropes of modernity*. Oxon: Routledge.

Gosden, C. (2005). What do objects want? *Journal of Archaeological Method and Theory, 12*(3), 193–211.

Goudineau, C. (1978). La Gaule transalpine. In C. Nicolet (Ed.), *Rome et la conquête du monde méditerranéen. Vol. 2: Genèse d'un empire* (pp. 679–699). Paris: Presses Universitaires de France.

Graham, S. (2006). *Ex Figlinis. The network dynamics of the Tiber valley brick industry in the Hinterland of Rome (BAR International Series 1486)*. Oxford: John & Erica Hedges Ltd.

Harris, E. (1986). Words and meanings. *ACCIPE ET VTERE FELIX*. In M. Henig & A. King (Eds.), *Pagan Gods and Shrines of the Roman Empire (Oxford University Committee for Archaeology Monograph 8)* (pp. 105–111). Oxford: Oxford University Committee for Archaeology.

Hegmon, M. (2003). Setting theoretical egos aside: issues and theory in North American archaeology. *American Antiquity, 68*(2), 213–243.

Hitchner, R. B. (2008). Globalization avant la lettre: globalization and the history of the Roman empire. *New Global Studies, 2*, 1–12.

Hodder, I. (2011). Human-thing entanglement: towards an integrated archaeological perspective. *Journal of the Royal Anthropological Institute, 17*, 154–177.

Hodder, I. (2012). *Entangled. An archaeology of the relationships between humans and things*. Malden: Wiley-Blackwell.

Hodder, I., & Hutson, S. (2003). *Reading the past. Current approaches to interpretation in archaeology*. Cambridge: Cambridge University Press.

Hodos, T. (2010). Globalization and colonization: a view from Iron Age Sicily. *Journal of Mediterranean Archaeology, 23*, 81–106.

Hutson, S. R. (2010). *Dwelling, identity, and the maya. Relational archaeology at Chunchucmil*. Lanham: AltaMira Press.

Ingold, T. (2000). *The Perception of the Environment. Essays in Livelihood*, Dwelling and Skill. London: Routledge.

Jennings, J. (2011). *Globalizations and the ancient world*. Cambridge: Cambridge University Press.

Knappett, C. (2005). *Thinking through material culture. An interdisciplinary perspective*. Philadelphia: University of Pennsylvania Press.

Knappett, C. (2008). The neglected networks of material agency: Artefacts, pictures and texts. In C. Knappett & L. Malafouris (Eds.), *Material agency. Towards a non-anthropocentric approach* (pp. 139–156). New York: Springer.

Knappett, C. (2011). *An archaeology of interaction. Network perspectives on material culture and society*. Oxford: Oxford University Press.

Knappett, C. (2012). Meaning in miniature: Semiotic networks in material culture. In M. Jessen, N. Johannsen, & H. J. Jensen (Eds.), *Excavating the mind* (pp. 87–109). Aarhus: Aarhus University Press.

Knappett, C. (Ed.). (2013). *Network analysis in archaeology. New approaches to regional interaction*. Oxford: Oxford University Press.

Knappett, C., & Malafouris, L. (Eds.). (2008). *Material agency. Towards a non-anthropocentric approach*. New York: Springer.

Knox, H., Savage, M., & Harvey, P. (2006). Social networks and the study of relations: networks as method, metaphor and form. *Economy and Society, 35*(1), 113–140.

Kopytoff, I. (1986). The cultural biography of things: Commoditization as a process. In A. Appadurai (Ed.), *The social life of things. Commodities in cultural perspective* (pp. 64–91). Cambridge: Cambridge University Press.

Krier, J. (1981). *Die Treverer außerhalb ihrer Civitas. Mobilität und Aufstieg (Trierer Zeitschrift Beiheft 5)*. Trier: Rheinischen Landesmuseum Trier.

Künzl, S. (1997). *Die Trierer Spruchbecherkeramik. Dekorierte Schwarzfirniskeramik des 3. und 4. Jahrhunderts n. Chr. (Trierer Zeitschrift Beiheft 21)*. Trier: Rheinischen Landesmuseums Trier.

Latour, B. (1988). *The pasteurization of France*. Cambridge: Harvard University Press.

Latour, B. (1999). *Pandora's hope. Essays on the reality of science studies*. Cambridge: Harvard University Press.

Latour, B. (2005). *Reassembling the social. An introduction to actor-network-theory*. Oxford: Oxford University Press.

Law, J. (1986). On the methods of long distance control: Vessels, navigation and the Portuguese route to India. In J. Law (Ed.), *Power, action and belief. A new sociology of knowledge? (Sociological Review Monograph 32)* (pp. 234–263). London: Routledge & Kegan Paul.

Law, J., & Mol, A. (2001). Situating technoscience: an inquiry into spatialities. *Environment and Planning D: Society and Space, 19*, 609–621.

Law, J., & Singleton, V. (2005). Object lessons. *Organization, 12*(3), 331–355.

Luik, M. (2001). Römische Wirtschaftsmetropole Trier. *Trierer Zeitschrift, 64*, 245–282.

Martin, T. (2005). Présigillées languedociennes de Narbonne et de Bram à Bordeaux: L'apport des fouilles récentes. *SFECAG Actes du congrès de Blois,* 427–446.

Mills, B. J., et al. (2013). Transformations of social networks in the late pre-Hispanic US Southwest. *Proceedings of the National Academy of Sciences, 110*(15), 5785–5790.

Mintz, S. (1985). *Sweetness and power. The place of sugar in modern history*. New York: Viking Penguin.

Mol, A. (2002). *The body multiple. Ontology in medical practice*. Durham: Duke University Press.

Mol, A. (2014). *The connected Caribbean. A socio-material network approach to patterns of homogeneity and diversity in the pre-colonial period*. Leiden: Sidestone Press.

Mol, A., & Law, J. (1994). Regions, networks and fluids: anaemia and social topology. *Social Studies of Science, 24*, 641–671.

Monteil, G. (2012). The sizes of samian vessels and dining: Evidence from Roman London. In D. Bird (Ed.), *Dating and interpreting the past in the Western Roman Empire. Essays in Honour of Brenda Dickinson* (pp. 330–345). Oxford: Oxbow.

Naerebout, F. G. (2006–7). Global Romans? Is globalisation a concept that is going to help us understand the Roman empire?.*Talanta,* 38–9, 149–70.

Norman, D. A. (1998). *The design of everyday things*. London: The MIT Press.

Oelmann, F. (1914). *Die Keramik des Kastells Niederbieber (Materialien zur römisch-germanischen Keramik 1)*. Frankfurt-am-Main: J. Baer.

Olsen, B. (2010). *In defense of things. Archaeology and the ontology of objects*. Lanham: AltaMira Press.

Olsen, B., Shanks, M., Webmoor, T., & Witmore, C. (2012). *Archaeology. The discipline of things*. Berkeley: University of California Press.

Passelac, M. (1986). Bram. In C. Bémont & J.-P. Jacob (Eds.), *La terre sigillée gallo-romaine. Lieux de production du Haut-Empire. Implantations, produits, relations (Documents d'Archéologie Française 6)* (pp. 48–51). Paris: Editions de la Maison des sciences de l'homme.

Passelac, M. (1992). Formes et techniques italiques dans les productions céramiques augustéennes du bassin de l'Aude: Mise en évidence d'un groupe d'ateliers. *Rei Cretariae Romanae Fautorum Acta, 31–2*, 207–229.

Passelac, M. (1996). Céramiques communes gallo-romaines en Languedoc occidental: Exemples de production et de consommation (fin Ier s. av. notre ère-IIe s. de notre ère). In M. Bats (Ed.), *Les céramiques communes de Campanie et de Narbonnaise (Ier s. av. J.-C.-IIe s. ap. J.-C.). La vaisselle de cuisine et de table. Actes des journées d'étude organisées par le Centre Jean Bérard et la Soprintendenza Archeologica per le Province di Napoli e Caserta, Naples, 27-28 mai 1994 (Collection Jean Bérard* 14) (pp. 361–387). Naples: Centre Jean Bérard.

Passelac, M. (2001). Deux fours de potiers augustéens du Vicus Eburomagus (Bram, Aude). In F. Laubenheimer (Ed.), *20 Ans de recherches à Sallèles d'Aude* (pp. 143–162). Paris: Presses Universitaires Franc-Comtoises.

Picon, M. (1973). *Introduction à l'étude technique des céramiques sigillées de Lezoux (Université de Dijon. Faculté des sciences humaines, Centre des recherches sur techniques gréco-romaines 2)*. Lyon: Presses de l'imprimerie universitaire.

Picon, M. (2002). Les modes de cuisson, les pâtes et les vernis de la Graufesenque: Une mise au point. In M. Genin & A. Vernhet (Eds.), *Céramiques de la Graufesenque et autres productions d'époque romaine. Nouvelles recherches. Hommages à Bettina Hoffmann (Archéologie et Histoire romaine 7)* (pp. 139–163). Montagnac: Monique Mergoil.

Pitts, M., & Versluys, M. J. (Eds.). (2014). *Globalisation and the Roman World. World history, connectivity and material culture*. Cambridge: Cambridge University Press.

Pollard, R. J. (1988). *The Roman Pottery of Kent*. Maidstone: Kent Archaeological Society.

Preucel, R. W. (2006). *Archaeological semiotics*. Malden: Wiley-Blackwell.

Schinkel, W. (2007). Sociological discourse of the relational: the case of Bourdieu & Latour. *The Sociological Review, 55*(4), 707–729.

Schlanger, N. (1994). Mindful technology: Unleashing the *chaîne opératoire* for an archaeology of mind. In C. Renfrew & E. B. W. Zubrow (Eds.), *The ancient mind. Elements of cognitive archaeology* (pp. 143–151). Cambridge: Cambridge University Press.

Sindbaek, S. M. (2007). Networks and nodal points: the emergence of towns in early Viking Age Scandinavia. *Antiquity, 81*, 119–132.

Skibo, J. M., & Schiffer, M. B. (2008). *People and things. A behavioral approach to material culture*. New York: Springer.

Smith, A. T. (2001). The limitations of doxa: agency and subjectivity from an archaeological point of view. *Journal of Social Archaeology, 1*, 155–171.

Strathern, M. (1988). *The gender of the gift. Problems with women and problems with society in Melanesia (Studies in Melanesian Anthropology 6)*. Berkeley: University of California Press.

Symonds, R. P. (1992). *Rhenish wares. Fine dark coloured pottery from Gaul and Germany (Oxford University Committee for Archaeology 23)*. Oxford: Oxford University Committee for Archaeology.

Thomas, N. (1991). *Entangled objects. Exchange, material culture, and colonialism in the Pacific*. Cambridge: Harvard University Press.

Throop, C. J., & Murphy, K. M. (2002). Bourdieu and phenomenology: a critical assessment. *Anthropological Theory, 2*, 185–207.

Turner, B. R. G. (1999). *Excavations of an Iron Age settlement and Roman religious complex at Ivy Chimneys, Witham, Essex, 1978-1983*. Chelmsford: Essex County Council.

Van Oyen, A. (2013a). Towards a postcolonial artefact analysis. *Archaeological Dialogues, 20*(1), 79–105.

Van Oyen, A. (2013b). *Rethinking Terra Sigillata. An archaeological application of actor-network theory*. Unpublished Ph.D. dissertation: University of Cambridge.

Van Oyen, A. (2014). Les acteurs-réseaux en archéologie: Etat de la question et perspectives futures. *Les Nouvelles de l'archéologie, 135*, 14–21.

Van Oyen, A. (2015). Actor-Network Theory's take on archaeological types: becoming, material agency, and historical explanation. *Cambridge Archaeological Journal, 25*, 63–78.

Van Oyen, A. (forthcoming). Networks or work-nets? Actor-Network Theory and multiple social topologies in the production of Roman *terra sigillata*. In T. Brughmans, A. Collar, & F. Coward (Eds.), *The connected past. Networks in archaeology and history*. Oxford: Oxford University Press.

Vilvorder, F. (1999). Les productions de céramiques engobées et métallescentes dans l'Est de la France, la Rhénanie et la rive droite du Rhin. In R. Brulet, R. P. Symonds, & F. Vilvorder (Eds.), *Céramiques engobées et métallescentes gallo-romaines. Actes du colloque organisé à Louvain-la-Neuve le 18 mars 1995 (Rei Cretariae Romanae Fautorum Acta Supplementum 8)* (pp. 69–122). Oxford: RCRF.

Watts, D., & Strogatz, S. (1998). Collective dynamics of 'small-world' networks. *Nature, 393*, 440–442.

Webmoor, T., & Witmore, C. L. (2008). Things are us! A commentary on human/things relations under the banner of a 'social' archaeology. *Norwegian Archaeological Review, 41*(1), 53–70.

Wightman, E. M. (1970). *Roman Trier and the Treveri*. London: Hart–Davis.

Willis, S. (2005). *Samian pottery, a resource for the study of Roman Britain and beyond. The results of the English heritage funded Samian project. An E-Monograph*. Internet archaeology: http://intarch.ac.uk/journal/issue17/1/toc.html.

Witmore, C. L. (2007). Symmetrical archaeology: excerpts of a manifesto. *World Archaeology, 39*(4), 546–562.

Wylie, A. (1993). A proliferation of new archaeologies: "Beyond objectivism and relativism". In N. Yoffee & A. Sherratt (Eds.), *Archaeological theory. Who sets the agenda?* (pp. 20–26). Cambridge: Cambridge University Press.