

## Thermal Objects: Theorizing Temperatures and the Social

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Does the cooling taste of some bodies which still have atmospheric temperature come from the fact that they have a greater capacity for heat? (...) Also the heat-conducting force of the body which comes into contact with the tongue must play a role here. Since in the end the effect of medications [Arzneymittel] on their capacity of heat might diminish, thus the taste, as related to coldness and heat, can certainly determine something concerning the inner effect of the medication [Mittel], and those who (...) find the taste of camphor and acids cooling, would not be entirely mistaken. Through the taste, heat can also become a means of determining the approximate capacity of heat, as soon as one first knows its capacity to conduct heat. (Ritter, 2010: 241)

These observations on the thermal are to be found in a book titled *Fragments from the Estate of a Young Physicist* from 1810. A self-taught scientist with a Romantic worldview, Johann Wilhelm Ritter mixed empirical science with speculative, aesthetic and religious thinking – influences that merged in a theory of electric vital power (see Richter, 2003; Holland, 2010). During his lifetime, the reception and acknowledgement of his groundbreaking discoveries – he uncovered the existence of ultraviolet rays and invented an early form of electrical storage battery – were weakened due to his unconventional thinking style and his abstruse methods. His early death was not least the result of his numerous self-experiments on muscles and sensory organs that he conducted from high-voltage experiments on his own body.

The quote above raises the question of thermal objects in quite a broad sense: Where is the thermal to be located? Is it a property, a quality, a state of specific objects and bodies (as the term ‘capacity for heat’ might suggest)? Is it a relation *between* bodies, since this capacity is always a *mediating* ‘capacity to conduct heat’ under the condition of a specific atmospheric temperature within an environment of other objects? Or is it a

sensory perception, an ‘inner effect’, a taste or a feeling of the human body? In Ritter's physicist terms, there is no fundamental difference between human and nonhuman bodies. As he dramatically demonstrated with his self experiments, it is not only the cooling or heating sensation of the human body that tells us something about different objects’ heat capacity, but the organic body with its sensory organs – the tongue, skin, ears, and nose – becomes a heat conducting force itself; the thermal subject turns into a thermal object. In Ritter’s experimental setting, the ‘cold’ abstract entities that temperature and electricity are from the perspective of physics were translated into an ‘ideology of self-knowledge and the practice of self-experimentation’ (Strickland, 1998: 453) that could be experienced through the sensorium of an inflamed Romantic subject. For the Romantic physicist Ritter, warmth is far more than a physical medium or capacity, it becomes a transcendent force of enlightenment: ‘When bodies melt, only then do they come to reason. Only now can they understand each other. So it is with us too. The “warmer” we are, the more we can understand, comprehend, we thaw’ (Ritter, 2010: 147). In this statement, it is the inverted thermal object that – through reason – turns into a thermal subject, and enters into a social relation by ‘understanding’ other things. Interestingly, this understanding doesn’t rely on the ‘cold’ reason of Western enlightenment that derives from the visual paradigm of rational observation, but rather it formulates an alternative model of ‘warm’ reason through thermal intersubjectivity that is possible through the melting and mingling of bodies.

Thermal objects are never stable entities but highly volatile and temporary constellations. Their transitory character – and this is the fascination with the thermal – is a genuine invitation to experiment; an inspiration to observe the traces heat and cold leave on human and nonhuman bodies. Temperatures sound out what bodies can do and what they can't. At the same time, they keep undermining the certainty about those bodily capabilities and limitations. Heat and cold push, expand and narrow the boundaries of bodies by exploring their reactions, changes and effects. Scorching heat makes a body swell, bitter cold makes it contract; contrasting temperatures lead to the opening and closing of bodies, to pain and delight, stability and dissolution. In other words, temperatures do and undo bodily boundaries.

The thermal is everywhere, from the microscopic to the global scale. From goose bumps triggered by a gentle breeze to a nuclear explosion, from microwave popcorn to an avalanche breakdown, from the cigarette break to frozen cells of

threatened animal species, thermal phenomena not only penetrate life in an immediate as well as highly mediated manner, but also in accidental and calculated ways. Admittedly, this list of examples appears random, but perhaps it is this very brimming ubiquity, the alleged universality and timelessness of the thermal that renders invisible how it shapes the social in various ways. Heat and cold are material forces affecting bodies without producing meaning in the first place. Because temperatures are not yet discursive, they seem to be located beyond the social. Their pre-linguistic, pre-discursive character is likely also the reason why temperature has mostly been neglected in the social sciences and humanities, apart from its metaphorical uses.

Several promising developments that could inspire theorizations of temperature beyond its deployment as metaphor are the different approaches in the field of new materialist thinking that avoid a foundational sorting of subjects and objects in order to rethink nonhuman agency. From a Latourian perspective (2005), we might speak of ‘thermal things’ that aren’t fixed as ontological entities, but are of interest in what they can do within specific networks, ecologies and assemblages of human and nonhuman actors. Strictly speaking, there are no thermal objects, there is only thermal action. The argumentative line of an Object-Oriented Ontology as formulated by Graham Harman (2002) and Levi Bryant (2011) shares the rejection of anthropocentrism, but stresses objects as entities that always carry a moment of withdrawal, as they are neither limited to their actions and practices nor to their theoretical description, which entails that thermal objects initially exist independently from human perception. For posthumanist thinkers such as Donna Haraway, such a distinct notion of objects becomes problematic, since different species, both human and nonhuman, co-shape each other in complex intertminglings with technologies. As Haraway prominently put it in her *Cyborg Manifesto* (1984), evolution has blurred the lines between human and animal, organic body and machine, natural and artificial, physical and non-physical. For a thermal theory, the cybernetic continuities between a thermodynamic model of the machine and the warmth of the organic body become a fascinating field of inquiry. And finally, concepts of thinking matter as processes of becoming – as articulated in the ‘vital materialism’ of Jane Bennett (2009) – have stressed that there is a ‘vital force’ that flows through and across human and nonhuman bodies and inevitably binds them together.

On the one hand, notions of intensities, flows, and energies that prevail in neovitalist understandings of an ultimate universe of relationality seem to be the perfect fit for understanding thermal relations. To think thermally means to think processually, it means to think in fluid transitions and processes of becoming without a neat separation of subjects and objects. Yet, on the other hand, why is it that the thermal is rarely an issue in new materialist debates? Even though the thermal is not restricted to connective thinking, it quickly points out the limits of purely relational accounts. The flow metaphors of affect studies and neovitalist thinking privilege a ‘warm’, close, and connective mode of becoming that tends to treat the cold, separating, cutting and disconnecting dimension as an exception, a mistake, an anomaly that disrupts the flow of connectivity.

Temperature is never simply a free flow of vital energies, but it is always embedded in mechanisms of regulation and control, both on the internal level of bodies regulating their core temperature to maintain it, and also regarding the politics of control and manipulation of those thermal systems. As Nicole Starosielski shows in this issue, the forms of thermal violence that have been installed throughout history often use the body’s own capacity to regulate temperature – these forms of violence don’t impose ‘foreign’ control techniques, but extend intrinsic thermal principles in order to turn them against themselves. The question of power relations is a crucial dimension of thermal theory that has to connect the pressing and wedded issues of fiery warfare, exploitation of natural resources and climate change to the intrinsic thermic qualities of the social.

The problematization of the thermal generates knowledge that has been circulating across the disciplinary backgrounds of physics, biology, geology, education, history and philosophy, through literature and popular culture as well as everyday life. In social and media theory, it has been mostly treated as metaphor due to its supposed non- or presocial status. The task of this issue is to map and critically synthesize the growing resources of thermal knowledge beyond metaphors in order to open it up for social and media theoretical research while keeping in mind that thermal theory is, and will inevitably remain, an interdisciplinary task.

As I have implied above, any approach to ‘thermal objects’ faces particular challenges when theorizing the relations between thermal subjects and thermal objects – challenges that arise from the specific character of the thermal as a material force of (dis)connection. Even if we assumed an intact

boundary between subjects and objects, the thermal would be the most a-subjective aspect of a particular subject. It is precisely the complex sociotechnical entanglements and biopolitical modulations of thermal processes that remind us that vitality is a temperature issue (Parisi & Terranova, 2000). In comparison to stone or metal, organic bodies of humans, animals, plants or bacteria have different thermal requirements and demands. Their flexibility to adapt to different (extreme) temperatures is limited, thus even subtle environmental oscillations modulate the condition of life. Evidently, temperature and its experience can be controlled, regulated and altered, but living beings keep being exposed to the thermal environments they created and influenced, both in terms of micro climates as well as on a broader scale of a globally changing climate.

When we move away from the human body, the question of thermoception gets even more complicated, since there is no longer a subjective position from which temperature can be sensed. How can we theoretically account for more-than-human thermal objects and elements? Material things such as soil and sand, smoke and clouds, have no simple edges or borders; they are, rather, pure surfaces (Connor, 2009). Drawing on the account of Michel Serres (2008) who has described the skin (not only of human bodies) as a milieu or a place of minglings, thermal atmospheres can be grasped as heterogeneously configured surfaces. How do different thermal bodies and surfaces meet, and how are their minglings, foldings and detachments organized? How can we study thermal traces on objects like, for instance, clay? How can we account for the relation between thermal techniques of control and their sensory effects – which also involve the sense of the haptic, the sense of touch? Thermal objects are preliminary objects, potentially dissolving through their mediations and environments. An object-centered approach of the thermal allows us to consider the specificities of different thermal bodies in their relationality and volatility as fixed objects, their politics of control and their sensory implications. This issue addresses four fields of inquiry: Thinking (beyond) thermal metaphor (1), thermal media and infrastructure (2), thermopolitics (3) and thermal senses and aesthetics (4).

### ***1. Thinking (beyond) thermal metaphor***

Even though one concern of this issue is to demetaphorize temperature, it would be too simplistic to just leave the history

of thermal metaphoricity either aside or behind. Instead, we assume that material and metaphorical traces of temperature are inseparably intertwined within ‘thermocultures’ (Starosielski, 2016). In metaphorical terms, the formation of modern, urbanized, largely Western society was often described as a cooling process that freezes the warm, authentic community. Interestingly, since the very beginnings of sociology at the turn of the twentieth century, the political and cultural perception of coldness was deeply ambivalent. It was mostly described in rather negative, cultural critical terms, such as Max Weber’s notion of the ‘cold skeleton hands of rational orders’ (1991: 347), or Ferdinand Tönnies’ discomfort, when he conceives of the community as a tight social form full of tenderness, protection and warmth and contrasts it with the society as a distant, artificial, mechanist, in short, cold form (1957). Others, for instance Helmuth Plessner (1999) or Georg Simmel (1971), were more enthusiastic about the distance that goes along with the development of modern society. As Helmut Lethen has vividly analyzed in *Cool Conduct* (2002), a culture of distance and affect control emerged within the heated climate of Weimar Germany, forging an alliance between conservative and liberal lines of thought. Constellations of social proximity and distance, the experience of connectedness versus disconnection, are theoretically and literary translated into temperatures of the social. ‘Coolness’ as a technique of controlled distance has heterogeneous cultural-historical articulations and roots, such as the concept of stoic apathy in European Antiquity (Newmark, 2013), the rhetoric of nineteenth-century American Abolitionism (Gersdorf, 2013) or etiquette rules in advice books from Early Modern Japan (Raz, 2013; see the volume ed. by Haselstein et al. 2013). The historical emergence of coolness in Postwar America (Dinerstein, 2017) entailed a set of cultural techniques, attitudes and strategies both in everyday life and in popular culture that are embedded in struggles of class, gender and race (Thompson, 2011); in addition, new ‘Laws of Cool’ (Liu, 2004) emerged across novel information technologies equally reproducing and undermining the postindustrial logics of knowledge production.

According to Lethen, the overheated atmosphere of Post World War I Germany was caused by the rapid changes in terms of urbanization and the fragile economic and political order. A few years earlier, in 1905, Weber not only diagnosed the coldness of rationality, but in his *Protestant Ethic*, he also wrote that ‘[the tremendous cosmos of the modern economic order] will so determine (the people) until the last ton of

fossilized coal is burnt' (1976: 181). What Weber offers us here is an energetic account of modernity in which the social order seems to depend on the creation and maintenance of material resources, in other words: fuel. As Duncan Kelly puts it, 'in his later work such environmental imagery had turned into a worry about the future as a polar night of icy darkness' (Kelly, 2015). Such a notion of energy links metaphorical readings with a material understanding of thermal forces. In this issue, contributors investigate different sites of the thermic, particularly those where the metaphor turns out to be more than a metaphor.

In the work of Claude Lévi-Strauss, modern 'hot' societies rely on the principle of cooking in both metaphorical and literal terms. Heat indicates the very logic of transformation which is easily comprehensible through the example of cooking: It transmutes raw foods, changing them internally as well as externally, making them digestible and enjoyable (Lévi-Strauss, 1978; 1994). In the course of modernization, this 'cooking' process becomes a generalized principle on a broader scale by producing excessive transformation without sparing a singular area of life (Lévi-Strauss, 1966). In contrast to heat, coldness is much more difficult to grasp, because it marks an absence. 'Cold' societies are located on the other end of the scale, preventing change and, thus, standing for stasis or conservation. Even though Lévi-Strauss disavows the idea that the attempt to undo change could possibly be successful – even in the most traditional cultures – and argues that it is exactly the Western gaze to which they appear as cultures without history, the hot/cold distinction was mostly rejected by process-oriented social and cultural theory for this simple reason: there are no cold cultures. Pointing out that this fact makes their equivalent of 'hot cultures' superfluous, Erhard Schüttpelz, in his contribution to this issue, develops an energetic reading of Lévi-Strauss by suggesting a notion of 'hot and cold techniques'. Whether a technique is hot or cold depends on the success of the incorporation of 'techniques into techniques'; it becomes a question of accumulation that is bound to the complexity (the organisational, energetic and modular structure) of a certain technical reality.

In my own contribution, I investigate the thermal organization of the cultural technique of cooking in comparison to the natural-cultural technique of fermentation. Stressing the neglected category of the rotted in the Lévi-Straussian culinary triangle, I rephrase the metaphorized reading of Lévi-Strauss in media-theoretical terms in order to show how the supposed

nature/culture distinction that was dominant in the cooking model, as well as in the model of hot and cold cultures, is challenged by the natural-cultural technique of fermentation.

From a non-metaphorical perspective, a different narrative of the thermal formation of the social might emerge, an alternative one to the genesis of the warm community and its freezing through modernity. What changes if we choose a material point of departure, a thermal object such as the phenomenon of fire? Fire has been investigated from both (popular-)scientific and cultural-historical perspectives, and has been understood as crucial for the formation of the social (Pyne, 2001; Wrangham, 2009; Clark and Yusoff, 2014). On the one hand, fire as one of the elements has been conceived of as a timeless force beyond society. On the other, the control of fire is seen as a precondition for culture – not only for basic cultural techniques like cooking, but also for language development and group formation. The challenge of lighting a fire, then controlling and maintaining it, forces people to cooperate and communicate (Goudsblom, 1995). This situation provokes a micro-scene of the formation of the social that is centered on a material and organisational problem rather than a symbolic one. Hence, it moves away from a representational line of thinking that tends to reduce the sensory qualities of heat and cold to mere metaphors for culture and the symbolic, as, for instance, Gaston Bachelard's *Psychoanalysis of Fire* (1987) surmises.

## ***2. Thermal media and infrastructure***

The example of fire shows that the metaphoric and literal dimensions of heat are closely intertwined. Fire is not only a myth or a symbol, but an infrastructure and a medium, as John Durham Peters explores in *The Marvelous Clouds* (2015). Fire generates a thermal environment that consists of objects, infrastructures, and media technologies. When we grasp fire as medium, as Peters does, its material characteristics and properties become visible: for instance, its rhythms and movements, and its capacity to transform, store, transfer, and conduct, but also its relatively short half-life.

Inspired by the hot-cold distinction of Lévi-Strauss, Marshall McLuhan (1964) coined the terms 'hot' and 'cool' media to describe the extent of sensual as well as cognitive involvement a specific medium requires. Hot media engage one's senses completely and demand little interaction from the user (as with radio and film). By way of contrast, cool media generally use



low-definition media that rely less on sensory immersion and rather demand a great deal of interaction on the part of the audience (like in TV or phone conversations). Even though McLuhan's point of departure is one of sensual engagement, literal heat and coldness don't play a role despite their multiple meanings for the sensory logic of media where temperatures function as generators, mediators and unwanted side effects (see the Special Issue Mulvin & Sterne, 2014; especially Starosielski, 2014). In *Media Hot and Cold* (forthcoming), Starosielski systematically maps out a critical media theory of temperature wherein she understands thermal modulation as a form of communication itself. By locating the effects digital networks have on technical practices such as thermostat operation, infrared cameras or ice production, she vividly outlines the emergence of new 'thermocultures' and related thermal regimes of discipline and control.

What about the counterpart of fire – ice? Coldness seems to resist common schemes of interpretation, as it has traditionally been defined as a negative category of a lack of heat both metaphorically – as absence of transformation, of affect, of involvement, etc. – as well as in physical terms. As Jennifer Croissant puts it: 'Coldness, and darkness or silences, are understood scientifically as privatives – as negative abstractions rather than positive entities' (2014: 12). Croissant cites a *New York Times* article from 1886 wherein the author states: 'Scientists tell us there is no such thing as cold (...) All this is very well, but to a man with frosted ears or acute chilblains it is sounding brass and tinkling cymbals' (ibid.: 13). By grasping coldness in terms of absence, not only the practical reality and experience of coldness is made invisible; it also appears as a static condition, denying the complex ways in which the perceived 'state' is processually being produced and maintained in a constant flux.

Unlike the abstract notion of coldness, ice has a very concrete, positive shape that makes it difficult to maintain the assumption of the 'actual' material absence of its property of coldness. In fact, ice plays an equally crucial role for modern society as fire, not only in its metaphorical dimension of distance as an elemental social form. As Paula Schönach unpacks in this issue from an environmental historical perspective, it is also part of an infrastructure of controlled coldness, allowing the refrigeration of objects and spaces, global cold chains, food hygiene, preservation, and air conditioning. While historically ice was the first infrastructural source of coldness that humans have used in an industrial manner, today fossil-fuel based

artificial refrigeration is the common practice for generating coldness. It is a coldness mediated by heat (fire energy).

Many cultural techniques require subtle temperature control that is easily forgotten because it works invisibly in the ‘background’, maintaining, for example, an average comfortable ‘room temperature’ of 20 to 22 °C. Due to this apparent complacency, thermal functions and efforts are often overlooked and only noticed when facing infrastructural problems: when the AC breaks on a hot day or the heating stops working while it is freezing outside. Maintaining ideal temperature and humidity level requires complex temperature work. In this issue, Samir Bhowmik explores the role of temperature and humidity for the long-term preservation and mediation of cultural heritage in museums and memory institutions. He asks how object and data storage environments are intertwined with the mediation of cultural heritage that relies on the use of energy generated by natural resources. In his contribution, Wolfgang Ernst de-metaphorizes temperature by grounding it within the broader media history of information theory. Discussing the notion of ‘entropy’ in the informational as well as physical sense, Ernst traces the temperature logic of binary information processing and its relation to ‘cold’ technological storage.

### ***3. Thermopolitics***

In the earlier example of fire, its symbolic interpretation was complemented by a medial and infrastructural perspective that stressed its formative and enabling functions for the social. In his essay, Nigel Clark offers us a third narrative of fire by describing the emergence of the modern subject from the perspective of a ‘pyropolitics’ of explosive weaponry. Rejecting the dichotomy between a creative and generative use of fire embodied by the alchemist and its destructive use by military explosive engineers, Clark investigates the continuum between modern warfare and art.

With the politics of fire we shift our focus to the interconnection of life and temperature that is also crucial in its thermal equivalent: the politics of ice. In biopolitical technologies of ‘cryopolitics’ (Radin & Kowal, 2017), cryo-preservation practices using dry ice, liquid nitrogen etc. are implemented in order to preserve and ‘postpone’ (potential) life by means of coldness. In the history of the 20th century, the politics of hygiene and practices of cooling chains, air

conditioning and pasteurization (Latour, 1988) have been important means of protecting, regulating and controlling different forms of life (Bud, 1993) – not only that of humans and animals, but also the life of bacteria (Hird, 2010). All those forms of life face new challenges in light of global warming and climate change. Besides the substantial long term effects for ecosystems, particularly on plant and animal life, the increasingly unbearable heat in some regions, for example in North Africa, where this is felt acutely, has forced local inhabitants to leave their home countries as climate refugees. They expose themselves to the extreme – often cold – weather conditions of the passage, and an eventual extended period of transit and endless waiting in their arrival countries (see Martin in this issue).

Scholarly debates on infrastructure have been stressing for some time that infrastructures are never just immobile supplements that function like ambient background tools, as a mere ‘passive substrate’ for sociality. Rather, they have been approached as relational actors that enable and participate in complex organisational work (see paradigmatically Leigh Star and Ruhleder, 1996). The political dimension of infrastructure becomes most obvious when looking at monitoring and surveillance technologies that utilize thermal sensors, such as the thermal imaging camera. Rooted in medical, military and scientific applications, the thermal camera is increasingly used in public and urban spaces, for instance as a ‘smart city sensor’ deployed for traffic monitoring; or as a monitoring technology in airports detecting potentially sick passengers, particularly those with an increased body temperature (Mulvin & Sterne, 2014: 2496). The thermal camera is a new form of biopolitical control in the Foucauldian sense, since it not only recognizes movements and light (as regular cameras), but reliably identifies ‘life’ by tracing its crucial indicator: The warmth of the organic body. These cameras capture every body, collecting data of a ‘population’ as a whole (see Lemke, 2011). But thermal discourses and techniques also mark cultural differences by producing and sorting gendered and racialized bodies. The historical tradition of climate determinism in the European history of Enlightenment (Hulme, 2011) has been serving as a discursive legitimation of – thermally underpinned – racialized forms of violence and control.

With the migration flows of the last years, new forms of thermal struggle and violence, but also new forms of critique and resistance, have emerged. In this issue, Niall Martin analyzes a conceptual documentary by Richard Mosse dealing

with migration as seen through the eye of a thermal camera. Martin provides an alternative reading to the critical-humanist perspective of the filmmaker by focussing on the materiality of heat within the thermal imaginary as a border-creating technology. From this perspective, the figure of ‘the refugee’ is not only produced by discourses, but by the thermal vectors of entropy, conductivity and intensity through which borders are marked and maintained.

In her contribution, Nicole Starosielski traces the politics of thermal violence from the sweatbox as an infrastructure of slavery and its survival in the contemporary prison cell to the ‘Heat Ray’ guns of the United States military. With the sweatbox predicated on forms of highly racialized violence, it uses the body’s capacity to mediate heat by manipulating its inner dynamics within an architecture of environmental intensification, leaving its traces invisible and indeterminate. By taking seriously the extended body that becomes crucial in the practices of thermal violence, Starosielski outlines a notion of ‘thermal autonomy’ that involves a definition of thermal rights in order to make visible, criticize and reform the (racial) regimes of contemporary thermal violence.

#### *4. Thermal senses and aesthetics*

Besides its medial, infrastructural and political dimensions, fire also produces heat and light, which leads us to the sensory materiality of the social. Sensory studies has addressed experiences that go beyond the classical five senses, such as the sense of motion and the sense of temperature (Potter, 2008; Ong, 2012; Allen-Collinson & Owton, 2015) that also provide a condition of ‘thermal delight’ (Heschong, 1978). In contrast to the sense of sight, which separates the seeing body from the object world, thermoception challenges the subject/object divide. Thermal information always indicates directional effects: the perception of coldness, for example, presupposes that an object or the environment makes a body colder. Affect theory has enthusiastically described heat as affect, as the ‘catalytic’ and potentially emancipatory energy of becoming and involvement (see Vannini & Taggart, 2014). Thermoception is not simply a free flow of energy. It is embedded within control circuits which help to maintain a certain body temperature while constantly being affected by outside factors of the ‘weather-world’ (Ingold, 2010). All thermal phenomena seem to be based on a regulative principle, be it internal or external, that is constitutive for their functioning. In what

follows, Jacquelyn Allen-Collinson and John Hockey demonstrate in their autoethnographic research how in the physical culture of long distance running the ability of the body to thermoregulate becomes a crucial organizing device. In a process of thermoceptive learning, the runner makes sense of the temperature work of her own as well as of the running partner's body (for instance when coping with temperature oscillations). Lara (2015) argues that heat shouldn't be reduced to a conscious activity of the human body but – with Whitehead – is rather to be understood as a 'relation between events of production of heat from three different scales of organization: molecular, organic, and cultural' (ibid.: 275). From this perspective, the ways in which we rationally make sense of thermal phenomena are always limited because we can't visually observe but only feel temperature which exactly involves the bodily, rather tentative ways of knowing which Allen-Collinson and Hockey describe. Thermal processes give us information that is commonly invisible to the senses of sight and hearing. What does it mean for aesthetic fields dominated by representational and visual paradigms as the arts if thermal principles interfere?

In his contribution, Gunnar Schmidt analyzes the complex affective, sensorial, indexical and relational functions of warmth and heat in installation art. Schmidt observes a 'new aestheticism of heat' in the 20<sup>th</sup> century that oscillates between an indexical use of 'raw' and 'direct' thermal phenomena such as fire and the reentry of symbolic readings. Such a thermal aesthetics refuses a simple disavowal of the representational/visual in favor of the haptic experience of temperature. Thermal cameras react to the incapacity of the eye to capture the traces of heat by detecting every subtle variation in heat. In her article, Hilary Bergen argues that utilizing this surveillance technology in the context of the arts might not only critically reflect on this origin, but that the technology's own 'haptic visuality' could serve as a tool to rethink the relation of vision and touch. With the example of the film *ORA* that explores dance through the lens of a thermal camera, Bergen makes the point that the 'technophilic materiality' of the thermal camera, instead of producing alienation, actually allows intimacy and touch and opens up to an aesthetics of the posthuman body.

The relation of temperature and touch is also crucial in Agustina Andreoletti's contribution about the material aesthetics of clay. By means of different artworks, she explores the temporal structure from raw clay practices which memorize the touch of making on its surface to the 'cooked' ceramic

firing technique of preservation. Taking into account these material practices of making, clay becomes visible as complex matter with transformative powers rather than a passive substance waiting to be formed.

The different thermal phenomena addressed by the articles show crucial dimensions of thermal objects. These phenomena don't remain objects in a narrow sense, they turn out to be media, infrastructures, matters of politics, pieces of art and a question of sensual engagement. Depending on their environment, thermal objects have mobile and possibly dissolving boundaries, and are constantly transforming into other forms and states. The identity of thermal objects is not given in advance, but is itself a product of a temporary 'freezing' of thermal processes. This temporary and highly precarious status as 'objects', condenses into the fundamental task of a social and media theory of the thermal: to analytically elaborate the singularity and irreducibility of different thermal materialities. As Ritter reminds us, we are thermal objects ourselves who have to melt in order to understand.

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