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A Comparison of Existing Frameworks Leading to an Empathic Formation Compass for Co-design

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Although empathy is an essential aspect of co-design, the design community lacks a systematic overview of the key dimensions and elements that foster empathy in design. This paper introduces an *empathic formation compass*, based on a comparison of existing relevant frameworks. Empathic formation is defined here as the formative process of becoming an empathic design professional who knows which attitude, skills and knowledge are applicable in a co-design process. The *empathic formation compass* provides designers with a vocabulary that helps them understand what kind of key dimensions and elements influence empathic formation in co-design and how that informs designers' role and design decisions. In addition, the *empathic formation compass* aims to support reflection and to evaluate co-design projects beyond the mere reliance on methods. In this way, empathic design can be made into a conscious activity in which designers regulate and include their own feelings and experiences (first-person perspective), and decrease empathic bias. We identify four important intersecting dimensions that empathy is comprised of in design and describe their dynamic relations. The first two opposing dimensions are denoted by empathy and differentiate between cognitive design processes and affective design experiences, and between self- and other orientation. The other two dimensions are defined by design research and differentiate between an expert and a participatory mindset, and research- and design-led techniques. The *empathic formation compass* strengthens and enriches our earlier work on *mixed perspectives* with these specific dimensions and describes the factors that foster empathy in design from a more contextual position. We expect the *empathic formation compass*—combined with the *mixed perspectives* framework—to enhance future research by bringing about a deeper understanding of designers' empathic and collaborative design practice.

Keywords – Empathy, Empathic Design, User-centered Design, Co-design, First-person Perspective, Mixed-perspectives.

Relevance to Design Practice – The *empathic formation compass* can support designers' awareness of the influence of their role during a co-design process. In addition, the *empathic formation compass* gives insight into empathic formation in design research, stimulates reflection in design education and contributes to the application of empathy in design practice.

Introduction

The work presented in this article is set up in the context of empathic and collaborative design. In sectors as diverse as business, education, government and health, design methodology is increasingly used in addressing the wicked problems that our society faces (Brown, 2008; Manzini, 2015). This trend has created a demand for more knowledge about design as a moderator of social change (Dorst, 2010). Further, societal changes and new technologies have broadened the challenges and problems that designers address and changed the way they work (Chen, Cheng, Hummels & Koskinen, 2016). In addition to functional and aesthetic products, designers now develop user friendly services, interactive learning experiences, and even organizational and social innovation processes, in collaboration with a diversity of stakeholders and within various public and private domains. Due to stakeholders' different interests, experiences and expertise, it can be hard for them to collaborate. Reciprocal empathy can connect these stakeholders on a deeper level and, as such, play an important role in recognizing each other's positions as well as in encouraging closer internal and external collaborations, thus delivering greater impact. Moreover,

a better understanding of each other's positions, motivations and aspirations can enhance shared decision making and benefits mutual solutions for shared problems. This requires a different role, competencies and expertise from designers as well as distinctive relationships between designers, users and other stakeholders. The methodology used by designers, including the way they approach and respond to others, influences how much impact is created. To understand the context and the diverse and sometimes contradicting viewpoints of all people involved, designers need to be interested and empathic towards all stakeholders and other design team members, and aware of the influence of their own positive or negative role on empathy in these processes.

Empathic Co-Design

The first to describe *empathic design* were Leonard and Rayport (1997). To address more emotional, social and complex design challenges for and *with* vulnerable people (e.g., people living with dementia), they suggested design approaches that consciously combine and balance objective and subjective mindsets. Since then, many scholars have developed empathic design research practices, methods and topics for empathizing with users (Fulton Suri, 2003; Kouprie & Sleeswijk Visser, 2009; Postma, Zwartkruis-Pelgrim, Daemen & Du, 2012; Koskinen & Battarbee, 2003). All these studies focus on designers' understanding of users' experiences, emotions and everyday practices. Yet, the understanding of designers' empathic formation is limited since it is only occasionally regarded as a more holistic psychological concept that can be consciously developed by designers (Hess & Fila, 2016).

Empathic design aims at understanding what is meaningful to people and why, *and* use that understanding in making design decisions, developing products, services and systems or imagining new meaningful and alternative futures. Therefore, empathic researchers and co-designers (from here on called designers) actively interact with people, engage in reciprocal dialogues (Mattelmäki, Vaajakallio & Koskinen, 2014) and develop and use convivial tools (Sanders & Stappers, 2008). In this way, they provoke people's tacit emotions, intuition, latent aspirations and feelings, and create shared experiences and common reference points among designers, users and other stakeholders (Mattelmäki et al., 2014). Moreover, empathic designers try to live and

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experience users' emotions themselves and use autobiographical memories to better understand the design situation (Sanders & Dandavate, 1999; Kouprie & Sleeswijk Visser, 2009). Still, the specific utility, legitimacy and validity of this first-person perspective in design is currently not sufficiently understood and recognized (Zhang & Wakkary, 2014).

In collaborative design projects with multiple stakeholders, designers take a specific role, which requires a distinct participatory mindset, behaviour, skills and knowledge (Light & Akama, 2012). Psychologists assert that empathy, defined as recognizing and sharing others' emotional states, is complex and concerns a difficult interpersonal and intrapersonal experience (Preston, 2007). Interpersonal experiences are verbal, non-verbal and physical actions or expressions, and call on designers' empathic behaviour and sensitivity in collaboration with others, such as extreme users and other stakeholders (from here on called users), and also with fellow design team members when sharing experiences or transferring insights (Postma et al., 2012). In collaborative projects, designers are often the facilitators (Light & Akama, 2012) rather than the design experts, as the boundaries between the designers, users and stakeholders blur. This requires designers to have an open, engaging and curious mindset, good observational abilities and collaborative skills (Mattelmäki et al., 2014), but also moment-by-moment shifts in position, focus and delivery (Light & Akama, 2012). According to Light and Akama in research little has been shared so far of the micro-dynamics of participation at its most intense, when designers as facilitators are challenged by a range of social contingencies. Intrapersonal experiences concern the conversation going on in your own mind and refers to the ability of designers to self-reflect in and on designing. It not only concerns the design decisions to be made, but also designers' willingness to disclose personal experiences in the interest of the project and the ability to regulate one's own emotions in interactions with users (Sleeswijk Visser & Kouprie, 2008). In recalling autobiographical memories (Kouprie & Sleeswijk Visser, 2009) or in contact with users, designers should consciously sense their own feelings, such as a state of empathic joy, concern or distress (Davis, 1996; Singer & Lamm, 2009; Mattelmäki et al., 2014). This can be inspirational (Zhang & Wakkary, 2014; Kouprie & Sleeswijk Visser, 2009), but also counter-productive. Distress, such as fear when co-experiencing an extreme user situation, pity when others share their emotional experiences, and shame in disclosing own experiences, can overwhelm designers, block their empathy and even cause withdrawal (Singer & Lamm, 2009). This ultimately limits designers' ability to facilitate and understand users.

In empathic co-design processes, designers share the control of the design process with users. Still, often they also elicit and interpret the empathic research outcomes. Moreover, they make sense of others by gaining personal insights into users' experiences (Sanders & Dandavate, 1999; Kouprie & Sleeswijk Visser, 2009). This all imposes challenges related to bias (Mattelmäki et al., 2014). Empathic bias can lead designers to misinterpret users' needs and to design inappropriate tools and outcomes. Designers' personalities, social and cultural

backgrounds, design maturity and own life experiences can colour the design process and design decisions, and can (mis)lead the interpretation of users' experiences (Mattelmäki et al., 2014). Likewise, designers' varying traits, skills, knowledge and personal experiences influence their state of mind, behaviour and design choices in situ towards users, which influences empathizing with users positively and negatively.

In conclusion, designers need to become more aware of the influence of their subjective, objective and reflective roles towards the people and the context they design for and with(in). The design community lacks an overview that brings insight into the key dimensions and elements that foster empathy in co-design. Therefore, our research objective is to provide the design community with such an overview which explains empathic formation as a meta-level concept that can be consciously developed and that guides designers in their facilitative role in co-design.

This paper is organized in three sections. First, we describe and compare relevant studies and related frameworks on empathy and its relation to design, uncovering dimensions and elements that empathy is comprised of in design. Then, we introduce the *empathic formation compass*, illustrate its potential utility—with the help of a real-life case study—and discuss how its dimensions and elements may support designers' empathic formation in design research, practice and education. Finally, we present our conclusions and identify opportunities for future research.

Theoretical Perspectives

Empathy

Recent research on empathy and the empathic brain has added to our understanding of empathy (Krznaric, 2014). Evolution biologists have demonstrated that we are social animals, empathic and cooperative by nature like other primates (De Waal, 2010). Child psychologists have discovered that small children can and do take others' perspectives (Bowlby, 2012) and that empathy can develop and grow throughout our lives (Singer & Lamm, 2009). Neurologists have discovered mirror neurons, which are triggered in our own brain when we see others' emotions. They help us feel what we would experience if we were the other (Keysers, 2011). Yet, psychological and social aspects can also influence empathy. Both nature and nurture are thus important for empathy to arise, grow and develop.

Social psychologists usually divide empathy into *cognitive* processes, *affective* experiences (Baron-Cohen & Wheelwright, 2004; Batson et al., 1997; Davis, 1996) and the ability to attune to or distinguish between *self and other* (Baldner & McGinley, 2014; Decety & Jackson, 2004). Affective empathy is the ability to share emotional experiences, whereas cognitive empathy concerns the ability to understand those experiences. Self-other distinction is important to maintain the source of the emotion (Decety & Jackson, 2004). Preston and De Waal (2002) define empathy as a shared emotional experience occurring when one person (the subject) consciously and deliberately attends to the state of the other (the object) and comes to feel a similar emotion. They argue that much behavioural evidence in empathy research points to the fact that empathizers use their *representations* to

predict, feel, understand and respond to the state of others. This means empathy grows with shared past experiences, similarity to, and familiarity with others.

In the context of design, Fulton Suri (2003) understands empathy as "our intuitive ability to identify with other people's thoughts and feelings—their motivations, emotional and mental models, values, priorities, preferences and inner conflicts" (pp. 52). There is widespread agreement that the ability to create meaningful concepts largely depends on the level of understanding and empathy that a designer or design team can gain with the users (Fulton Suri, 2003; Koskinen & Battarbee, 2003; Kouprie & Sleeswijk Visser, 2009). In a paper recapitulating what happened to empathic design, Mattelmäki et al. (2014) argue that empathic design currently focuses on sensitivities in four layers. First is the sensitivity towards *techniques* in applying generative, prototyping and visualizing tools to communicate and explore issues. Second is the sensitivity towards *design* outcomes in seeking potential design directions and solutions. Third is the sensitivity towards *people* in gathering inspiration and information about and making sense of people and their experiences and the design context. Fourth is the sensitivity towards *context* and collaborations: tuning the process and tools according to the co-designers, decision makers and organizations involved. We will discuss these sensitivities below, paired in design techniques and design outcomes, which represent design process elements, and in people and context, which represent the designers' role and behavior.

Sensitivity towards Techniques and Design

Product design has roots in engineering design and user-centered design and, as a consequence, many formal product design methodologies advocate a research-driven design approach leading to design directions and solutions (Cockton, 2009; Sanders & Stappers, 2008). Traditional product development or user-centered design projects have been formalized and executed on types of methods that are used in different phases (Laurel, 2003). This paradigm is widening. In current co-design practices, designers are sensitive towards techniques that are more imagination-oriented, co-creative, participatory and design-led (Cockton, 2009; Sanders & Stappers, 2008; Wolf, Rode, Sussman & Kellogg, 2006). As a response to this shift in focus and the subsequent expansion of the designer's toolkit, we observe an emerging body of work calling on design methodology to move beyond *the method* as its main unit of analysis (Lee, 2012; Woolrych, Hornbæk, Frøkjær & Cockton, 2011). In a programmatic paper, Woolrych et al. (2011), for example, urge us not to see methods as *indivisible wholes*, but rather as a loosely coupled set of resources that can be molded to the local priorities and the project's context. Still, in many current design discussions empathy is seen as a utility and thus mainly concerns developing and utilizing techniques to find insights and develop design outcomes (Lee, 2012). Less often empathy is considered a more holistic psychological concept (Hess & Fila, 2016). Lee responds to this in her thesis *Against methods* by proposing to frame innovative empathic methods as evolving processes and constitutive stages rather than tools. We embrace this shift from a

focus on and sensitivity towards empathic techniques to a focus on and sensitivity towards empathic awareness, learning and growth in designing. This ultimately leads to a sensitivity towards empathic and appropriate design directions and solutions.

Sensitivity towards People and Context

In current co-design projects, we see that designers are confronted with two challenges as projects involve more stakeholders and more complex contexts. First, designers need to understand the context and the diverse and contradicting viewpoints of the people involved. This means being interested and empathic towards all stakeholders, such as the person with dementia *and* the family involved *and* the professional caretakers *and* the government. Ideally, empathic designers also enhance empathy between the co-design participants in the process they facilitate: both stakeholders and users towards each other—since this can be the beginning of the solution—and design team members towards other team members. The second challenge is that designers should not neglect their own viewpoints and experiences, and how these might influence others and their own empathy in a positive or negative way (Sleeswijk Visser & Kouprie, 2008; Kouprie & Sleeswijk Visser, 2009). Empathy can definitely benefit from first-person perspectives (Kouprie & Sleeswijk Visser, 2009; Zhang & Wakkary, 2014) as we discussed earlier. Yet, it can also be clouded by the designers' identity, experiences and role (Vink & Oertzen, 2018). Moreover, empathic people can run into the *empathy trap* (i.e., too much empathy blinds them to their own needs; Mattelmäki et al., 2014), *hot-cold empathy gaps* (i.e., underestimating the influence of one's own current state when empathizing; Loewenstein, 2005), or *projecting* (i.e., mapping one's own emotions to the other; Batson et al., 1997). Designers can end up projecting their own assumptions onto the experiences of others and falsely rationalize design directions. This may lead to single mindedness, a present-day orientation, reinforce otherness, enhancing exclusion, and ironically to designing for people like themselves (Holt, 2011). Subsequently, the scope and value of design outcomes may be biased towards the designer as the designer often takes the dominant role in a co-design process (Takeyama, Tsukui, Yamaguchi & Motai, 2012). Consequently, designers need to be aware of this possible empathic bias. Self-reflection in action (Schon, 1987) is needed to prevent misinterpretation. Designers need to become more aware of the influence of their subjective, objective and reflective roles and state towards the people and the context they design for and with(in).

Design Research Objective

The construct of empathy is thus complex. Moreover, above paragraphs call on two issues with respect to Mattelmäki's sensitivities in empathic design. First, there is too much focus on *method orientation* in design (Lee, 2012; Woolrych et al., 2011) and we see a shift towards a focus on empathic formation processes (Hess & Fila, 2016; Lee et al., 2018). Second, there is unclarity on the influence of designers' first-person perspective on their objective or subjective *role* towards people and context (Zhang & Wakkary, 2014). We conclude that the design community lacks

a meta-level overview of empathic formation that not only brings insight into the construct and the evolving process of empathy, but also initiates reflection in and on design action (Hess & Fila, 2016; Kouprie & Sleeswijk Visser, 2009). More specifically, reflection on the designers' role and design decisions. Our research objective is to provide the design community with such a metal-level overview for reflection, presented in the form of an *empathic formation* (EF) *compass*.

We expect that on the basis of this overview and better knowledge of empathic formation, designers can also legitimately utilize personal experiences (the first-person perspective) and prevent personal distress, withdrawal and empathic bias in relating to others and in designing outcomes. Moreover, we argue that the *empathic formation compass* can support the evaluation of empathic formation in co-design projects.

In two previous studies, we already elaborated on building empathic capacity and we expect this work valuable to the development of an *empathic formation compass*. In our first study, we proposed an empathic design framework: *mixed perspectives* (Smeenk, Tomico & van Turnhout, 2016). This fundamental framework decouples methodology from methods and provides a more holistic view of designers' objective, subjective and reflective roles, and how to legitimately use personal experiences, the first-person perspective. We will explain this approach in the following section in more detail. Yet, it is important to note that in this empirical case study discussion, we found two issues. First, it seemed hard for some junior designers to understand the continuum within the second-person perspective: from a more distant observation of others to close immersion between others. Second, it seemed hard for some of them to understand the differences and relations between designers' first-person experiences and designers' third-person assumptions. Our explanations of the perspectives still seemed too abstract. In hindsight, this could have been caused by not positioning the perspectives along dimensions. In the second study (Smeenk, Sturm, Terken & Eggen, 2018), we proposed that empathy in design can be operationalized by five distinct factors: emotional interest, sensitivity, self-awareness, personal experience and mixed perspectives. These factors refer to the designers' role in empathic design projects, the value of personal experiences and design maturity. These factors will also be explained in more detail in the next section. Still, these factors miss contextualisation regarding methodology. Moreover, the factors that foster empathy in design are not yet connected to the *mixed perspectives* study.

Next, we aim to provide the design community with an overview of studies which explains the complex construct of empathy as a meta-level concept that can be consciously developed and that guides designers in their facilitative role.

Existing Studies and Models

In this section, we describe and compare seven relevant studies on empathy and design, which can contribute to the conceptualization of an *empathic formation compass* in design. These studies were found by using the snowball method, a non-random reference tracking method, and form the basis for our final *empathic formation compass*.

Perception Action Model

The first inspiration comes from Preston (2007), who discusses empathy from a behavioural psychology perspective. Based on the Perception Action Model (PAM), which she developed with De Waal (Preston & De Waal, 2002), she aims to explain how people come to feel the states of others. The model points out that an empathizer must be motivated to and capable of behaving and responding empathically in three ways: attune, experience and respond. Translated to the design context, this means that designers should consciously attend and attune to the state of the users. Second, they must be willing to open themselves up to experiencing a similar emotional state as the user and/or to activating similar autobiographical experiences. Finally, designers should generate a suitable and sensitive emotional response to users. All this must occur while inhibiting contagious and empathic distress and maintaining focus on the users. Preston argues that when the integrity of any of these state processes is undermined, so is the designer's ability to empathize, and empathic bias towards users' experiences can occur. They state that bias can be decreased with awareness of designers' mindset and behaviour.

Empathic Design Framework

Kouprie and Sleeswijk Visser (2009) looked at empathy from a design approach point of view. In their search for a framework for empathy in design, they propose a dynamical four-phase process: discover, immerse, connect and detach. Each phase explains what role the designers' own experiences (first-person perspective) can play when having empathy with the users. In the *discover* phase, the designers approach the users (by desk research or in the real world) and enter their world. Designers' curiosity makes them willing to really understand the users. In the *immersion* phase, the designers take a more active role and are surprised by the aspects that influence the user's experiences. Subsequently, the designers take the user's point of reference and absorb it without judging. In this *connect* phase, the designers resonate with the users and connect on an emotional level by recalling their own personal experiences and feelings to find meaning. In the *detach* phase, the designers leave the user's world and try to make sense of all the insights on the user's perspective as design experts and translate these into design deliverables. These design phases clearly are

in line with Preston's (2007) state processes discussed above: attune, experience and respond. Yet, Kouprie and Sleeswijk Visser contextualize these specifically to design.

Empathy Types

Hess and Fila (2016) study empathic growth and development in the context of engineering. In a single paper (2016), they develop three different concepts of empathy. First, they distinguish between the terms empathic development, empathic growth and empathic formation. They define *empathic formation* as understanding the formative process of becoming empathic towards users, including understanding required skills. This resembles our overall goal of understanding empathy at a meta-level and inspired the name of our compass. They relate *empathic growth* to designers' thriving ability to apply pre-existing skills or dispositions. Finally, they relate *empathic development* to designers' growing understanding of users' experiences. In addition, Hess and Fila mention five important *guidelines* for developing empathy. The first three are in line with the behavioural aspects (state processes) discussed by Preston (2007): 1) empathy must be consciously experienced, 2) empathizing is contingent upon the ability to regulate one's own emotions, and 3) empathy does not manifest in every interaction with others, since humans tend to be biased. They also mention two other aspects: 4) empathy will only be internalized when a designer reflects on and finds purpose in incorporating empathy into their mode of being, and 5) reflecting on how empathy operates throughout first-person experiences with real-world users makes empathy training more effective. These last two *guidelines* are in line with respectively Sleeswijk Visser and Kouprie's (2008) work on self-reflection and their process of stepping into and out of users' lives (Kouprie & Sleeswijk Visser, 2009). Reflection and first-hand experiences are important in order to internalize and train empathic growth. Finally, overcoming the absence of an ideal means for understanding empathic development, Hess and Fila (2016) conceptualize empathy in an overview defined by two intersecting dimensions distinguishing between *self-* or *other-orientation*, and *affective experiences* or *cognitive processes*. This results in four empathy types: empathic distress, empathic concern or joy, imagine-self perspective taking and imagine-other perspective taking (see Figure 1). Empathic concern and empathic
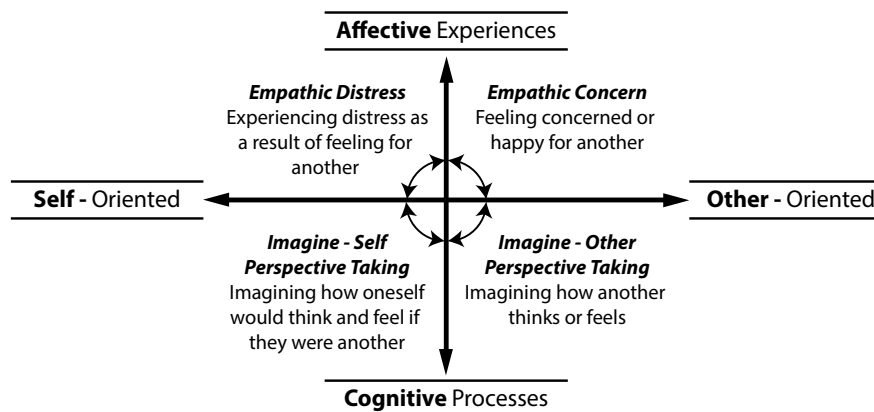

Figure 1. An overview conceptualizing empathy types and the interrelationships between them (Hess & Fila, 2016)**.**

distress are outcomes of a person's state process, which is in line with Preston (2007). In contrast, imagine-self and imagine-other perspective taking concern design activities and techniques. The latter can be seen as steps in a design approach, just like the example of Kouprie and Sleeswijk Visser (2009). Although not developed specifically for design, this overview of empathy types and especially their cyclical relationships may enable designers to understand how empathic capacity can or cannot be built and that building empathic capacity is a dynamic process. This refers to mixing perspectives (Smeenk et al., 2016).

Design Research Landscape

Sanders and Stappers (2008) describe design research and practice in a model defined by two intersecting dimensions: one dimension denotes design research techniques and the other denotes the designers' mindset (see Figure 2). The mindset dimension is divided in an expert and a participatory mindset. The technique dimension is divided in a research-led and a design-led dimension. Research-led approaches are based on traditional design and are mostly fact and data driven. They refer to cognitive processes. On the other hand, design-led approaches are more recently developed and more experimental and inspiration-oriented (Sanders & Stappers, 2008), using physical artefacts as thinking tools. The expert mindset involves designing *for* people: designers are the design experts and the co-design participants are reactive informers. In contrast, the participatory mindset involves designers working *with* people. The people are seen as the true experts of their own experiences. They are active co-design partners and share control over the process and outcome, while designers facilitate. This mindset refers to the second-person perspective (Smeenk et al., 2016). Sanders and Stappers (2008) argue that designers' traits influence their perceptions of user experiences and that it might be difficult for some designers to move from the expert mindset to the participatory mindset or vice versa. This entails a significant cultural change.
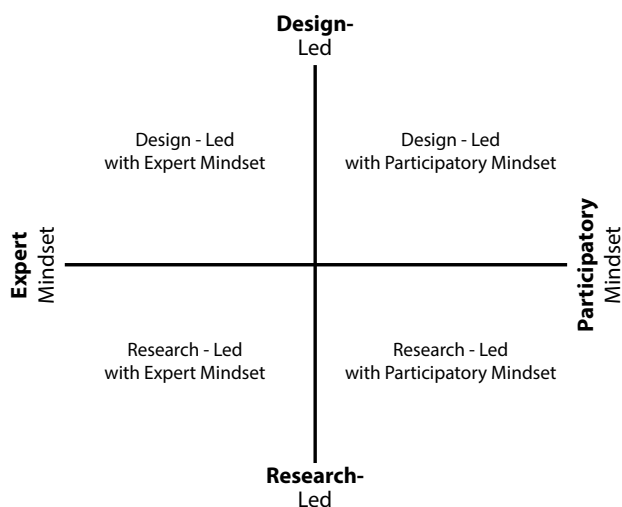
System of Coordinates

Recently, Dong, Dong and Yuan (2017) examined empathy in design from a historical and cross-disciplinary perspective. They seem to be the first to introduce a three-dimensional overview on empathy (see Figure 3). Two dimensions in their model refer to empathy and have already been discussed since they resemble the framework of Hess and Fila (2016) depicted in Figure 1. These denote affection versus cognition and subject orientation versus object orientation. The new third design process dimension denotes attitude versus technique. They refer *attitude* to designers' behavioural responses and mindsets that contribute to empathy with users. And *technique* is referred to designers' professional abilities that contribute to empathy, e.g., mastering design methods. Figure 3 shows that techniques and attitudes are seen in the light of both other dimensions: self versus other orientation and cognition versus affection, which makes this model rather complicated. Moreover, their work is missing an explicit and contextual explanation of the technique versus attitude dimension. In comparing the studies from Dong et al. (2017) and Sanders and Stappers (2008), we see a commonality and deficiency regarding the mindset and technique dimension(s). Unlike Dong et al. (2017), who divide technique from mindset, Sanders and Stappers (2008) show two separate opposing dimensions. They divide one dimension in an expert versus a participatory mindset, and another in design-led versus research-led techniques. We argue that Sanders and Stappers' two dimensions are more complete with regard to the design process, but since they are not explicitly focussed on empathy, they can be complemented with the empathic dimensions of Figure 1 and 3: cognitive-affective and self-other.

Mixed Perspectives

We will now refer in more detail to the two studies we conducted ourselves in order to expand the dimensions with other key elements which we consider important in empathic formation.
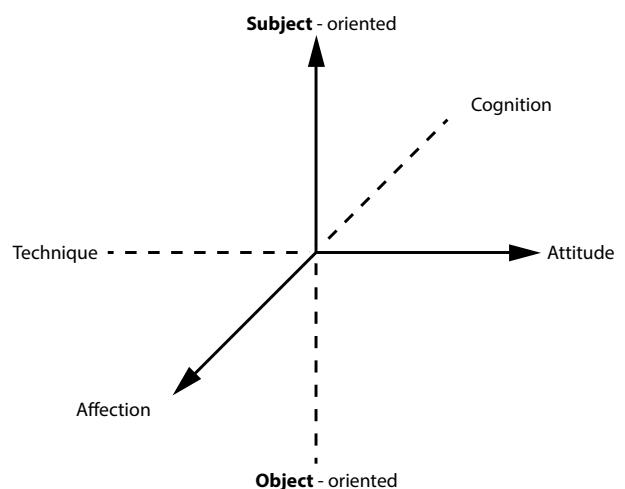

Figure 2. The landscape of design research
(Sanders & Stappers, 2008)**.**

Figure 3. A system of coordinates on empathy
(Dong et al., 2017)**.**

In our search to give flexible guidance to design in emotional settings, we proposed an empathic design framework: *mixed perspectives* (Smeenk et al., 2016), as shown in Figure 4. Based on earlier work of Tomico, Winthagen and Van Heist (2012) and a real-life case study concerning mourning, we improved the understanding of the three basic perspectives that a designer can take and identified their specific values. The first-person perspective involves designers' own experiences *within* the design context, which enables them to use intuition. This perspective leads to an intuitive framing, based on designers' past or current lived experiences. The second-person perspective concerns users' or stakeholders' experiences. Designers learn *with* users in the design context and this leads to an empirical framing, obtained in situ. Last, the third-person perspective concerns designers studying existing knowledge and work produced by others *or* designers developing new work *for* users. This leads to a theoretical framing. The second-person perspective and third-person perspective are consistent with Sanders and Stappers' (2008) participatory mindset and design expert mindset, respectively. It is important to note that the three perspectives in Figure 4 are dynamic and related: they complement and reinforce each other when combined or altered, creating *perspective clusters*. This mixing refers to the cyclical relations that Hess and Fila (2016) also identify in their model. Moreover, the perspective clusters—as building blocks—can be seen as a new code or rule of conduct for empathic designing. They do not focus on methods but on perspective switches. Our study also uncovered the value of these perspective clusters, and indicated how a specific *approach path* can influence the resulting framing. For instance,

a shift from the third-person perspective to the second-person perspective brings designers an empirically enriched theoretical framing, whereas a shift from the second-person perspective to the third-person perspective delivers a theoretically scaffolded empirical framing (Smeenk et al., 2016). One approach path relates to Kouprie and Sleeswijk Visser's (2009) description of *stepping into and out of the users' life* activities: this cluster starts in the third-person perspective and moves via the second- and first-person perspective back to the third-person perspective. This example shows that perspectives cannot be seen as single or separate units—just as methods—but are related to each other, overlap and are combined in design processes. These dynamic relations—which the *mixed perspectives* approach uncovers—makes designers aware of the value of changing mindsets and thus techniques. It inspires designers to consciously take, alter and mix three basic perspectives to credibly empathize with users (Smeenk et al., 2016). Moreover, this *mixed perspectives* approach supports designers in employing relevant personal experiences and intuition in projects that require great sensitivity in a more credible and intentional way, which may enhance design outcomes. As such, a better understanding of the relative value of the first-person perspective compared to—and combined with—other fundamental perspectives can contribute to enriching and developing design methodologies. Yet, how the individual perspectives and the perspective clusters are characterized with regard to empathic dimensions (such as orientation, process, mindset and technique) is not explicitly shown in the *mixed perspectives* framework of Figure 4 as the studies in Figure 1, 2 and 3 do demonstrate.
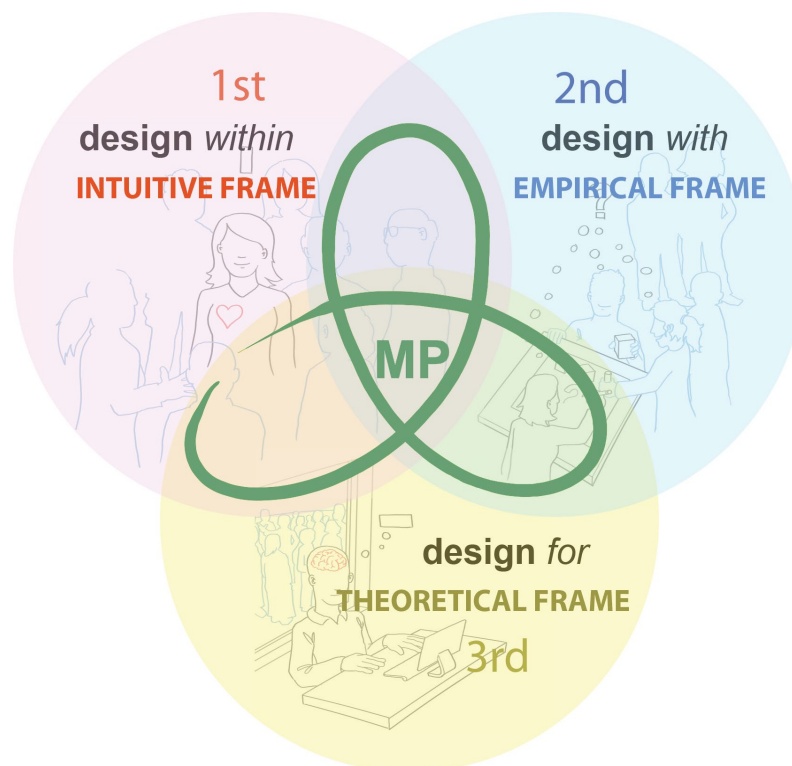

Figure 4. A visual representation of the mixed perspectives (MP) **in empathic design** (Smeenk et al., 2016).
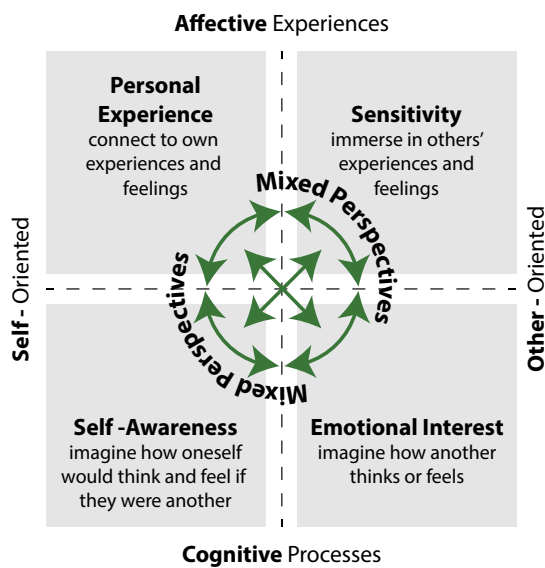
Figure 5. Five factors that foster empathy in design
(Smeenk, Sturm, Terken & Eggen, 2018)**.**

Empathy Factors

In our second study, where we searched for factors that support measuring empathic growth and evaluating empathy in co-design projects, we propose—based on Baldner and McGinley (2014)—that empathy in design is operationalized by five individual factors (Smeenk, Sturm, Terken & Eggen, 2018). Inspired by the overview made by Hess and Fila (2016), we mapped these factors to the two psychology dimensions: self- versus other-orientation and affective experiences versus cognitive processes (see Figure 5). Three factors refer to designers' mindsets in empathic design: these are *emotional interest* in and *sensitivity* to users,

and *self-awareness* in understanding users. The fourth factor, *personal experiences*, can be seen as an information source and the fifth factor, *mixed perspectives*, as a design approach. The latter navigates through the other four factors, as represented with arrows in Figure 5. The figure shows how empathizing is a dynamic and relational process and that the construct of empathy is based on both affective design experiences and cognitive design processes, and orientation on self (the designer) and others (experts, stakeholders and users).

Insights

The studies described in this section, summarized in Table 1, provide two starting points for our *empathic formation compass*. First, Hess and Fila (2016), Sanders and Stappers (2008), Dong et al. (2017), and Smeenk et al. (2018) provide insightful dimensions. The two dimensions of Hess and Fila (2016), and Smeenk et al. (2018) are based on the psychology construct of empathy: cognition versus affection, and self versus other distinction. Sanders and Stappers' dimensions do not specifically focus on understanding empathy, but do on understanding designers' roles in terms of their mindsets and the techniques they use. Whereas Dong et al. focus on all: mindsets, techniques, behavioral process and orientation. Yet, Dong's et al. three-dimensional visualization is rather complex. Therefore, the starting point of our compass' dimensions for empathic formation in design are the two empathy dimensions we first found in Hess and Fila's model and the two design dimensions in Sanders and Stappers' model, which were depicted in Figures 1 and 2 respectively. By including these dimensions, the dimensions of Dongs' et al. model are also included, be it with a slight adaptation. In addition, we will include the empathy factors described by Smeenk et al. (2018) in Figure 5 as behavioural elements.

Table 1. Seven existing studies that contribute to the conceptualization of empathic formation in design.

Model	Domain	Description	Approach	Elements
1. Perception Action Model	Psychology (Preston & De Waal, 2002)	Empathic state process	Take several points of view in a sequence	Attune Experience Respond
2. Empathic Design Framework	Design (Kouprie & Sleeswijk Visser, 2009)	Dynamic design phases	Take several points of view in a sequence	Discover Immerse Connect Detach
3. Empathy Types	Engineering (Hess & Fila, 2016)	Conceptualize empathy	Understand Orientation Understand Process	Self–Other Affective–Cognitive
4. Design Research landscape	Design (Sanders & Stappers, 2008)	Conceptualize design research	Understand Technique Understand Mindset	Design-Research led Expert–Participatory
5. System of Coordinates	Design (Dong et al., 2017)		Understand Orientation Understand Process Understand Mindset/Technique	Subject–Object Affection–Cognition Attitude–Technique
6. Mixed Perspectives	Design (Smeenk et al., 2016)	Empathic Perspectives	Take several Perspectives in a flexible sequence	First-person Second-person Third-person
7. Empathy Factors	Design (Smeenk et al., 2018)	Factors	Understand Mindset Take several Mindsets in a flexible sequence	Emotional interest Sensitivity Self-awareness Personal experience Mixed Perspectives

Second, we found that Preston (2007), Kouprie and Sleeswijk Visser (2009), and Smeenk et al. (2016) approach empathy as a *dynamic process*, where designers consciously take several points of view towards people and context in order to understand them and respond appropriately. These points of view practically *guide* designers as they define their role without being too explicit about specific techniques. Kouprie and Sleeswijk Visser (2009), and Preston (2007) both define one specific process sequence, whereas Smeenk et al. (2016) leave this more open. To demonstrate that empathy is a dynamic and relational process, we will plot the *mixed perspectives* approach from Smeenk et al. (2016) to the compass dimensions. We expect that the *empathic formation compass*—with its four dimensions, mixed perspectives elements and empathy factors—informs and explains designers how empathy can be obtained during a design project. In the next section, we will explain and visualize the *empathic formation compass* that serves to conceptualize *empathic formation in design* by integrating above insights.

The Empathic Formation Compass

In the previous section, we described and compared seven different studies which all have specific value for understanding and guiding empathy in design. In this section, we introduce the *empathic formation compass* (see Figure 6). Empathic formation concerns the understanding of the formative process of becoming an empathic design professional who knows which attitude, skills and knowledge are applicable in an empathic design process.

A two-dimensional compass is a simple and useful way, and a relevant metaphor for explaining the complex construct of empathy. A compass is a practical instrument for orientation and navigation during an empathic co-design project. It supports conscious activity, behaviour and reflection: the compass shows designers where they might go and how. The four dimensions and eight compass points show the feasible directions, and the perspectives and perspective combinations explain possible process steps. Depending on the contextual complexity of and social contingencies in a co-design project, the compass supports designers in making design decisions.

We will first introduce and outline the dimensions of the *empathic formation compass*. Then, we will show how the individual perspectives and perspective combinations are characterized with regard to the empathic formation dimensions. Finally, we will use the case study about mourning from our prior research (Smeenk et al., 2016) to illustrate how designers can navigate through the *empathic formation compass* in a co-design project context involving vulnerable users.

Dimensions

In Figure 6, we introduce the *empathic formation compass* for co-design. Four intersecting dimensions define the compass. The dimensions of the *empathic formation compass* each represent a continuum and not one extreme or the other, e.g., not just cognitive or affective, but more cognitive than affective. The first two dimensions are related to empathy (solid lines) and denote
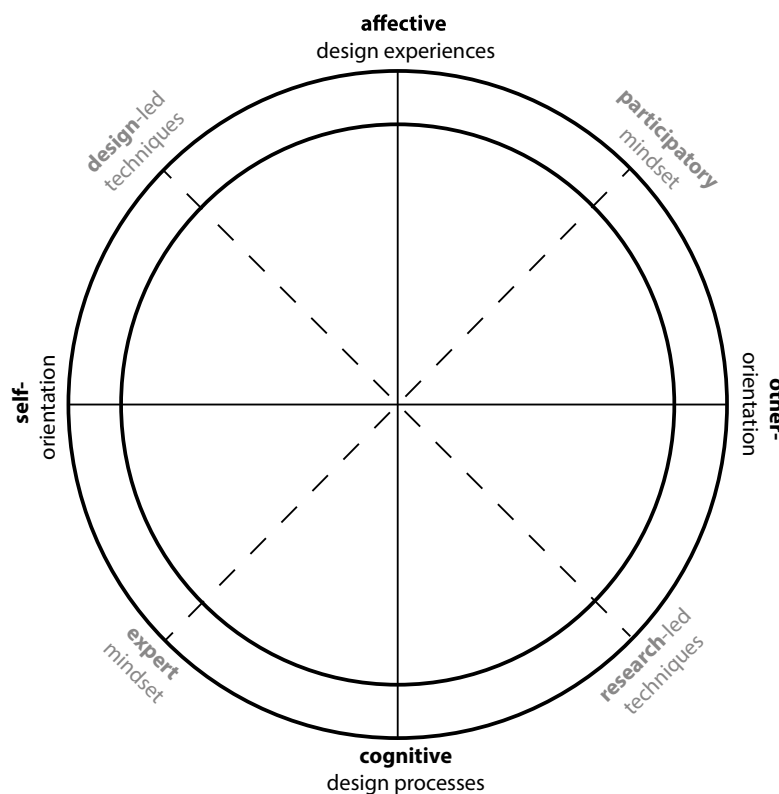
Figure 6. The empathic formation compass for co-design.

cognitive design processes versus affective design experiences, and self-orientation versus other-orientation. The other two dimensions are related to design research (dashed lines) and denote an expert versus participatory mindset, and research-led versus design-led techniques.

Figure 7 shows how the *empathic formation compass* incorporates the three basic perspectives that a designer can take: the first-, second- and third-person perspective. Further, this figure shows the information sources and the factors that foster empathy in design per quadrant. The two empathy dimensions demonstrate that each perspective taps into a specific source of information: designers' lived experiences or work, or others' lived experiences or work. Each information source stimulates a distinct mindset: personal experience, sensitive, self-aware or emotional interest. To represent the perspective combinations, we show the different perspectives as three overlapping circles. We will explain each dimension in detail below.

Empathy Dimensions

The first opposing empathy dimension differentiates between *cognitive design processes* and reasoning at the bottom of the compass and *affective design experiences* and resonance at the top of the compass (see Figure 6). Affective empathy is the ability to share emotional experiences, and cognitive empathy concerns the ability to understand those experiences. By this division, designers can differentiate between experiences and feelings of people in the real world and theoretical knowledge. This dimension separates the third-person perspective from the first- and second-person perspectives (see Figure 7). Third-person perspectives are mainly cognitive and employed from a distance; they involve studying the work or knowledge of others (e.g., literature, documentaries, data, or design work such as products or services) or designers creating new work. In contrast, second- and first-person perspectives are positioned in the real world; they involve experiences of others or self.

The second opposing empathy dimension distinguishes between *self* on the left side of the compass and *other* on the right side of the compass (see Figure 6). Self-other distinction is important for maintaining the source of emotion. A focus on the *other* means the designer is informed by the expressions (work or experiences) of others. *Others* in design can involve experienced others (e.g., stakeholders, clients or users) or knowledgeable others (e.g., context experts or design peers). A focus on *self* means that designers use their own relevant experiences—personally or professionally—to understand users or develop visions, hypotheses and ideas to help them. Consequently, this dimension divides the third-person perspective into developing one's own work or knowledge versus using others' work or knowledge (see Figure 7). Moreover, this dimension separates the first-person perspective from the second-person perspective.
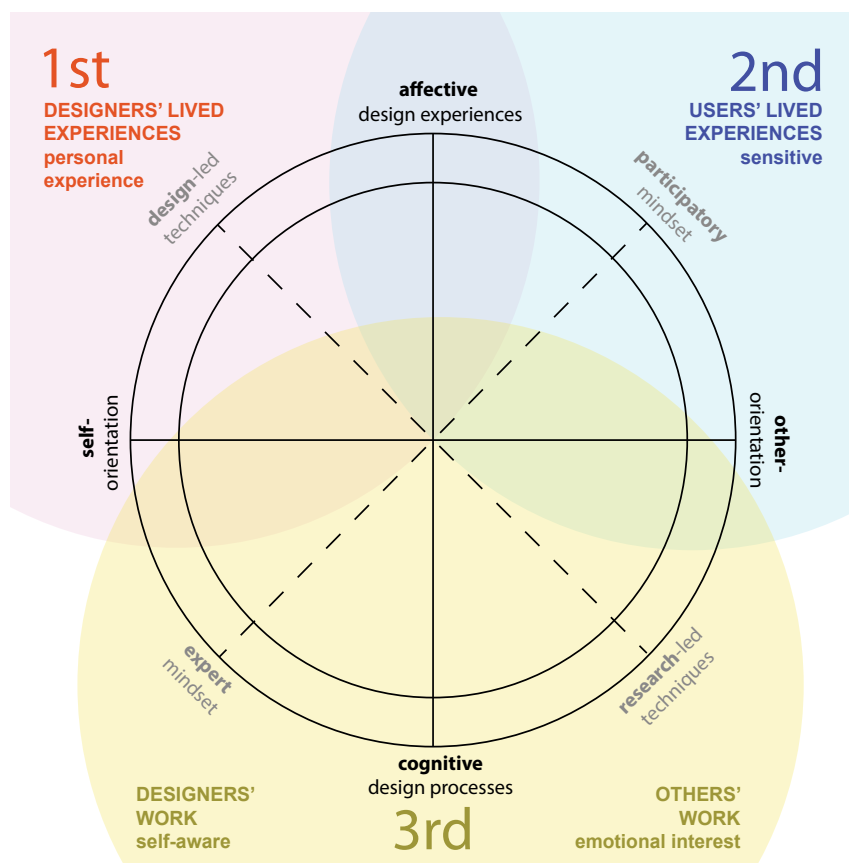

Figure 7. The *empathic formation compass* incorporating the *mixed perspectives* framework.

Design Dimensions

The first opposing design dimension divides *design-led techniques* on the top left side of the compass from *research-led techniques* on the bottom right side of the compass (see Figure 6). This distinction supports designers in deliberately choosing a more subjective or objective approach. This dimension divides the second-person perspective (see Figure 7). To illustrate this, co-experiencing and generative techniques are seen in the design-led segment of the second-person perspective, whereas more observational techniques are found in the research-led segment of the second-person perspective.

The second opposing design dimension distinguishes between an *expert mindset* on the bottom left side of the compass and a *participatory mindset* on the top right side (see Figure 6). The expert mindset involves designing *for* people: designers are the experts and the people are reactive informers. The participatory mindset involves designers interacting *with* people. This distinction enables designers to deliberately choose between designing *for* or *with* users. Moreover, this dimension divides the first-person perspective in designers using personal experiences currently attained *within* the exact same user situation or using one's own memories from a similar design situation. This distinction helps designers deliberately focus on their current experiences in situ or on past experiences in similar situations other than the specific design context. An example of the latter is found in the *empathic handover* approach (see Smeenk, Sturm & Eggen, 2017), where designers—in an empathic discussion—connect to own experiences in order to understand others' feelings.

Perspectives

With the help of the *empathic formation compass*, we can now conclude how the individual perspectives and the perspective combinations are characterized with regard to empathy.

The third-person perspective is defined as a mainly cognitive design phase that leads to a theoretical framing. Yet, it is important to note that this perspective can be oriented towards the designer him or herself or towards others. When oriented towards others, this perspective includes research-led techniques and is more objective. The designers' emotional interest in the people being designed for is stimulated by studying existing theoretical information resources (e.g., the work or knowledge of others such as literature, documentaries, data, or design work such as products, services or systems). When oriented towards the self, this perspective entails a more design expert mindset. When developing new knowledge about or new work for others (e.g., finding theoretical opportunities or solutions for a design problem in hypothesis, prepare convivial tools, develop visions, design directions, criteria, ideas, concepts or prototypes), designers need to be self-aware and avoid preconceptions and bias.

The second-person perspective is characterized as a mainly affective design experience with a focus on others. This entails a participatory mindset and leads to an empirical framing. The users' experiences and expressions are the information source, and the designers are sensitive when observing or interacting with users in situ. This perspective is divided into design-led or research-led techniques. In research-led techniques, designers observe and interview users. In design-led techniques, both designers and users are actively involved: they co-experience and co-create. Designers facilitate and use convivial tools.

The first-person perspective is also characterized as a mainly affective design experience with a self-oriented focus. Designers' lived experiences are the source of information and the approach is design-led. This perspective is divided into expert and participatory mindsets. In the expert mindset segment, designers use their own relevant memories and personal experiences although non-situational. In the participatory mindset segment, they call on personal experiences of current interactions with users and within the design context.

The combination of the first- and second-person perspectives is characterized as an affective design experience. The sources of information are both the users' experiences and designers' lived experiences in situ. The combination requires a participatory mindset and a design-led approach. For instance, designers may co-experience a day in the life of a person and engage with users, for example through embodied interaction.

The combination of the first- and third-person perspectives is characterized by self-orientation. The sources of information are designers' similar (although non-situational) experiences and their own work. The combination requires an expert mindset and a design-led approach. Affective experiences and cognitive processes alter and balance each other. For example, designers may develop concepts based on their own experiences, intuition and imagination (i.e., critical design) and provoke opinions in a following phase with users.

Last, the combination of the third- and second-person perspectives is characterized by an orientation towards others. The sources of information are both the work of others and users' lived experiences and expressions. The combination requires a research-led approach and a participatory mindset. Affective experiences and cognitive processes alter and balance each other. For example, designers may compare existing research data with their own empirical data and improve design requirements.

Illustration of the Empathic Formation Compass

To illustrate the *empathic formation compass* and its components, we revisit the real-life case study concerning mourning, which we discussed in detail in a previous article (Smeenk et al., 2016). This study was conducted in the context of design education, where we analysed the design process of four individual junior designers' projects. These designers reported on and explained their design activities and indicated when and how they employed the first-, second- and third-person perspectives or combinations. One junior designer had first-person experience with mourning, because her father died. Because her design process showed the highest number of perspective alternations, we chose to use her case to illustrate the *empathic formation compass*. In the following paragraph, we describe the deliberately abstracted design process and each of her design activities combined with the associated position on the

empathic formation compass' dimensions. The numbers plotted in the *empathic formation compass* in Figure 8 correspond to her design activities in chronological order and can also be found in the table of the Appendix explaining how the design activities were plotted onto the *empathic formation compass*.

The junior designer started her design process with a design pressure cooker in which she reviewed literature on mourning (1a) and generated first ideas (1b). This was followed by a gathering with her mother in which they both attended to their own mourning experiences (2). By analyzing her own and mother's experiences, she retrieved two clear design opportunities (3), which she checked with available literature (4). In turn, she searched for existing solutions (benchmarks) and existing rituals to expand her solution space (5). Then, she evaluated her design opportunities and the benchmark solutions with her own experiences (6). Next, she generated new ideas (7). Followed by a fictive re-enactment with Lego (8), a re-enactment with her mother (9) and on her own (10). This brought her clarity and insight into the differences in her own and her mother's experiences in the same situation. Then, she co-reflected with her mother on the situation and found prior non-visible issues (11). Conclusively, she created a design concept (12). She then evaluated if this design concept could have worked for her when she was mourning (13). Deep personal emotions came up. Then she co-evaluated the concept with her mother (14) and she drew conclusions supported by psychology literature on child-parent relationships (15). Subsequently, she

developed new concepts by herself, with her mother and other designers, followed by a synthesis and prototype development (16). Moreover, she evaluated the experience prototype with children of the same age she was when she lost her father (17). Finally, she used this feedback, and own intuition in optimizing the concept (18, 19) and detailing the prototype (20). Her approach path can be retained in Figure 8.

By plotting this real-life case study onto the *empathic formation compass*, we can draw up the following insights. First, we can conclude that most of the design activities plus accompanying perspectives, mentioned by the junior designer in our study of 2016 (Smeenk et al., 2016), could be positioned quite easily in the *empathic formation compass*. To exactly position the activity numbers in the compass, we had to choose between four different parameters, which can be translated into the following four questions: is a design activity more focused on self or other; more affective or more cognitive; taken with a more participatory or expert mindset; and more design- or research-led? Most of the design activities fit one of the eight parts of the compass or are on a dimension line. For example, activity 2 is on a dimension line as it considers first- and second-person perspectives according to the junior designer. Moreover, the overview demonstrates that most activities are positioned in the self-orientated and expert mindset part, which can be explained by the fact that the junior designer is an experience expert in mourning and will be a designer in profession. Although the resulting overview gives
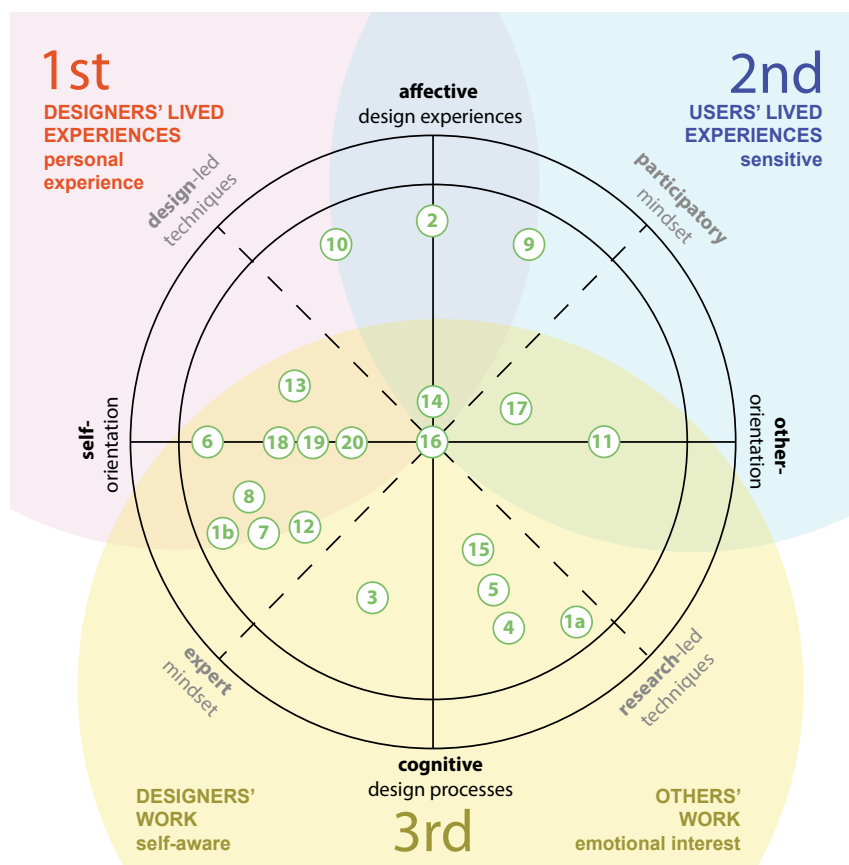
Figure 8. An example of the *empathic formation compass* in use: the mourning case study (Smeenk et al., 2016).

insight into the dynamic process taken by the junior designer, the illustration of this case study has also its limitations. First, it only employs one junior student project sample. At the same time, we encountered some difficulty in positioning design activity 14, where the designer co-reflected with her mother and analyzed the different experiences in their common mourning situation. This was reported as a combination of the first- and third-person perspective by the junior designer. In hindsight, this activity also included a second-person perspective. Moreover, a new question arose concerning the exact positioning of the three overlapping circles representing the three basic perspectives on the y-axes of the *empathic formation compass*. In future research, when the *empathic formation compass* is used as a reflection tool in action instead of on action, this can be further explored and validated.

Discussion

In this paper, we compared existing frameworks on empathy and design to provide the design community with a new overview which explains the complex construct of empathy as a meta-level concept that can be consciously developed (Hess & Fila, 2016). We proposed the *empathic formation compass* and its accompanying key dimensions and elements. Although we realize that the *empathic formation compass* presented needs to be developed further and validated by empirical research, we argue that our illustration shows that the *empathic formation compass* is promising as a navigating tool in co-design. It can support designers in their facilitative role towards people, collaborations and contexts, and in making design decisions regarding techniques and outcomes (Mattelmäki et al., 2014). In addition, the compass can support designers' reflective, objective and subjective roles. We will discuss the prospective value of the *empathic formation compass* for design research, practice and education in detail below.

Value for Design Research

The *empathic formation compass* provides design researchers with a meta-level concept (Hess & Fila, 2016) and a vocabulary that helps them to understand and study empathic formation in co-design. The complexity of the construct of empathy in design is expressed in the *empathic formation compass'* four intersecting and opposing dimensions, whereas the perspectives and behavioral factors provide for its elements.

The compass—as an analyzing tool—can be used to assess co-designs' evolving processes beyond the mere reliance on methods (Lee, 2012; Woolrych et al., 2011) by plotting the design activities onto the compass' dimensions, just as the illustrative case study in Figure 8 demonstrated. Such a potential comparative analysis of several processes can lead to a deeper understanding of the characteristics (i.e., commonalities, differences and gaps) in existing design methodologies, e.g., user-centred design, participatory design, generative design, empathic design and co-design. Moreover, the compass can offer inspiration in developing new approach paths of *mixed perspectives,* so called perspective clusters (Smeenk et al, 2016). We especially foresee future research possibilities for perspective clusters including the first-

person perspective. The compass' dimensions and elements can then be used as guidelines.

Value for Design Practice

In the *empathic formation compass,* empathy is approached as a meta-level concept that can be consciously developed (Preston, 2007) and that can guide designers in their facilitative role in co-design processes. The compass is a practical instrument for navigation which supports conscious empathic design activity, empathic behaviour, sensibility in collaborations and reflection in and on action. The compass does not prescribe a specific *empathic design process*, nor one approach path or method, but moves beyond the method (Lee, 2012; Woolrych et al., 2011) by focusing on the process of empathic formation and the value of perspectives within specific emotional and local design contexts. Moreover, the *empathic formation compass* acknowledges the first-person perspective in developing empathy with others (Zhang & Wakkary, 2014).

The *empathic formation compass*—as a process tool—can enhance reflection on the designers' objective and subjective role by being explicit about an orientation towards self or others and taking an expert or participatory mindset towards stakeholders, the collaboration and the context. As a project unfolds, the *empathic formation compass* can guide designers and provide alternative approach paths when a process needs to be adapted to sudden changes and contingencies, such as (im)possibilities involving users and stakeholders (Lee et al., 2018). Although it is difficult to change from the expert towards the participatory mindset (Sanders & Stappers 2008), these moment by moment shifts in position, focus and delivery are crucial in co-design settings (Light & Akama, 2012). The *empathic formation compass* combined with the *mixed perspectives* approach give guidance. The four dimensions show the feasible directions, and the perspectives and perspective combinations explain possible process steps. Depending on the contextual complexity of and social contingencies in a co-design project, the compass flexibly supports designers in making alternative design decisions.

On the basis of the *empathic formation compass*, designers can also legitimately utilize relevant personal experiences (Preston & De Waal, 2002; Kouprie & Sleeswijk Visser, 2009) and prevent personal distress, withdrawal and empathic bias in relating to others and in professionally designing outcomes (Vink & Oertzen, 2018). Moreover, by consciously considering an affective or cognitive design process step and using design- or research-led techniques designers deliberately head to different preliminary design outcomes: theoretical, empirical and intuitive frames (Smeenk et al, 2016). Both information and process guidance—with respect to the four layers of sensitivities in empathic design—are then provided (Mattelmäki et al., 2014). In addition, the factors that foster empathy in design (emotional interest, sensitivity, personal experience and self-awareness, Smeenk et al., 2018) explain the act of engaging others and engaging towards others and might help to overcome some of the micro-dynamics that go on in co-design processes (Light & Akama, 2012).

Value for Design Education

The *empathic formation compass* can offer a good starting point in education for the explanation of and the reflection on empathic awareness, learning and growth. Empathy can be taught and internalized (Preston, 2007; Singer & Lamm, 2009) when a designer consciously reflects and finds purpose in incorporating empathy in their mode of being (Hess & Fila, 2016; Sleeswijk Visser & Kouprie, 2008). Since designers' private learning is often intuitive, left tacit and not shared with others (Stappers & Giaccardi, 2017), the *empathic formation compass*—used as a reflection tool—can be helpful. As a practical instrument for orientation, it can stimulate junior designers, peers and their coaches to discuss their knowledge, thriving empathic skills and empathic growth as a professional empathic designer and researcher and make the learning more explicit by reflection in action (Schon, 1987). The *empathic formation compass* can support students in reflecting on and learning how state of minds and behavioural responses influence empathy, meaningful design action and design outcomes. More specifically, students can discuss and learn how to use and regulate their own experiences and feelings in the affective parts of the design process just as Hess and Fila (2016) mentioned in one of their guidelines for developing empathy. By explicitly discussing the self-oriented side and the accompanying intrapersonal skills, designers can learn how to incorporate relevant personal experiences in designing (Zhang & Wakkary, 2014) and prevent empathic bias (Vink & Oertzen, 2018) and contagious distress (Singer & Lamm, 2009). The dimensions of the *empathic formation compass* represent each perspective as a continuum. This solves the few problems we found in our case study (Smeenk et al., 2016): the compass dimension design- versus research-led now distinguishes between designers' observation of others and designers' immersion among others in the second-person perspective, and the compass dimension affective experience versus cognitive process distinguishes between designers' first-person experiences and designers' third-person assumptions. Moreover, the mindset and technique dimensions can be seen as empathic design maturity or performance 'indicators' in education (Hess & Fila, 2016).

Conclusion and Future Research

In this paper, we contributed to a meta-level concept of empathic formation in design that not only brings insight into the construct—the key dimensions and elements—and the dynamic process of empathy, but also initiates reflection in and on empathic design action. Our *empathic formation compass* provides researchers, designers and students with an overview and a vocabulary that helps them to reflect on what influences empathic formation in design. The compass expresses the complex construct of empathy in design using four intersecting and opposing dimensions, whereas three basic perspectives and behavioral factors provide for its elements. In addition, the position of the perspectives and the perspective combinations within the e*mpathic formation compass* clarify designers' objective, subjective and reflective roles towards people, collaborations, context, and design decisions:

technique and outcomes. Finally, the *empathic formation compass* aims to evaluate co-design projects beyond the mere reliance on methods by assessing *mixed perspectives* approach paths. With the compass, we shed light on the complex construct of empathy, empathy as an evolving process in design and designers' roles in dynamic empathic design processes, and herewith we widen the design community's current focus on method orientation.

Although we did not validate the *empathic formation compass* with design researchers, design professionals or design students in action, we argue that this paper serves as a starting point for discussing the *empathic formation compass* as a backbone for empathic design. We look forward to seeing how the *empathic formation compass* evolves in future research, practice and education. The *empathic formation compass* can enhance future research by bringing about a deeper understanding of the designers' empathic co-design practice. In addition, we expect our work to offer inspiration for developing new approach paths, perspective clusters. We especially foresee future research possibilities for perspective clusters including the first-person perspective, since the specific utility legitimacy and validity of the first-person perspective in design is currently not sufficiently acknowledged. Finally, we intend to conduct more research on how to define and predict designers' empathic design maturity based on the *empathic formation compass* as a theoretical model.

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Appendix

Approach path junior designer.

Nr	Design activity	Perspective	People Orientation	Design Process	Design Mindset	Design Techniques
1A	Literature search	3	Other	Cognitive	Expert	Research
1B	Brainstorm	3	Self	Cognitive	Expert	Design
2	Compare experiences	1 & 2	Self & Other	Affective	Participatory	Design
3	Define design opportunities	3	Self	Cognitive	Expert	Design
4	Evaluate design directions with literature	3	Other	Cognitive	Expert	Research
5	Benchmark search	3	Other	Cognitive	Expert	Research
6	Compare benchmark with own experiences	1 & 3	Self	Cognitive & Affective	Expert	Design
7	Create ideas	3	Self	Cognitive	Expert	Design
8	Fictive re-enactment	3	Self	Cognitive	Expert	Design
9	Re-enactment with mother	2	Other	Affective	Participatory	Design
10	Re-enactment by herself	1	Self	Affective	Expert	Design
11	Co-reflect	2 & 3	Other	Affective & Cognitive	Participatory	Research
12	Create concept	3	Self	Cognitive	Expert	Design
13	Evaluate concept based on own experiences	1	Self	Affective	Expert	Design
14	Co-evaluate concept	1 & 2 & 3	Self & Other	Affective & Cognitive	Expert & Participatory	Design & Research
15	Conclusion	3	Other	Cognitive	Expert	Research
16	Create and analyze prototypes	1 & 2 & 3	Self & Other	Cognitive	Expert	Design
17	Co-evaluate prototypes	2	Other	Affective	Participatory	Design
18 19	Detail prototype	1 & 3	Self	Affective & Cognitive	Expert & Participatory	Design
20	Final prototype	3	Self	Cognitive	Expert	Research