Incorporating Environmental Psychology in Architectural Design Processes

- Creation of a Translation Tool based on Affordances

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Abstract

Considering the enormous investment society makes in developing and shaping the built environment, and the huge impacts that buildings have on people's health and well-being, there is an urgent need to better understand how to design buildings for human welfare. In the realm of architectural practice, designers are increasingly met with demands to present evidence of how their designs perform from a user perspective.

Evidence-based insights from the field of environmental psychology provide a wealth of empirically based knowledge on the relationships between people and the physical environment. However, even as calls for evidence-based design intensifies, there is a lack of clearly defined strategies for connecting findings from environmental psychology with the processes of architectural design. This indicates the existence of an archive of academic knowledge that is currently not being implemented to a satisfactory level in the creation and maintenance of the everyday physical environments in our societies.

The overarching objective of this Master's thesis has been to explore a way to bridge the gap between research from the field of environmental psychology and architectural design practice. As a means of investigation, a translation tool based on the concept of affordances, was developed and subsequently tested and evaluated, in a pilot study involving a design team within an architectural studio.

The outcomes of this study indicate the relevance of such translation tools, but also a difficulty for them to work independently. However, the format of the pilot study as a facilitated workshop, where the architects under guidance could engage with knowledge from the field of environmental psychology, worked very well. This suggests that the facilitated workshop format holds considerable potential as a strategy for bridging the gap between the two fields.

Keywords: Environmental Psychology, Architectural Design, Tool Development, Affordances, Research Implementation, Applied Research

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1. Background

1.1 Gap between academic research and practical design

Research in the field of environmental psychology contains an amount of knowledge about the relationship between people and their socio-physical context - from how the context impact their activities, to how it influences their health and well-being (Gifford, 2014a; Steg, Van den Berg and De Groot, 2013; Bell, 2001; Bechtel and Churchman, 2002). However, my experience, as an architect and urban planner in Denmark, is that most designers creating the physical environments around us, are unaware about this catalogue of academic knowledge, and hence base their design decisions on their own understanding, experience and intuitive preferences, rather than an evidence-based knowledge of how their design influence and engage the users. There seems to be a lack of a clear strategy for how to connect findings from the academic field of environmental psychology to real life design processes.

The experience described above is supported when looking into academic literature. Kirkeby (2009, 2010, 2012) has through her research addressed the question of research-based knowledge in relation to architectural practice in a Danish context. Her conclusion is that while architects are good in making use of various layers of 'knowledge' in a broad sense (from data and rules, to understanding and inspiration), they pay very little attention to research made in established academic institutions - hence a large gap exists between professional research and practice (Kirkeby, 2012). The distance between design practitioners and traditional academia is documented and highlighted by several other researchers (Sylvest, 2016; Lawson 2006; Gifford 2014b).

1.2 Three main barriers

From both literature and personal experience, I can identify three main barriers for the implementation of knowledge from environmental psychology into architectural design. An overview of each barrier is described below.

1.2.1 Lack of time and resources

First of all, resources within the building industry are often scarce and a lack of time is almost always the case within architectural design processes, preventing architects from incorporating new ideas that require time consuming research activities (Kirkeby 2010, 2012; Sylvest 2016). Since most designers work under profit based and production focused frames, they do not have the time to search for and get acquainted with research presented in articles, reports and books. Sylvest (2016) describes the dilemma:

> Viewing only the specific production of drawing and designing a building as the 'real work' of architecture creates a situation in practice, where it is difficult to incorporate new information. Here, the time it necessarily takes to read or listen, and thus be able to incorporate this new information, is not a billable part of a specific design project, and as a result, the architects have no time to engage in the activities that might otherwise have served to inform and strengthen their practice.
>
> (Sylvest, 2016, p. 199)

Kirkeby (2010, 2012) concludes that architectural firms in general prefer to hire a consultant or expert, in order to gain instant knowledge about a specific problem, instead of search within the world of published research.

1.2.2 The complexity of the field of environmental psychology

The second barrier is that the field of environmental psychology is wide, diverse and complex - and as such not always easy to define or communicate. This complexity might make the discipline difficult to comprehend for persons outside the domain. The ambiguous character is apparent when looking into the history of the field, as well as the different attempts to categorise and subdivide it (Gifford 2014a; Gifford 2014b; Giuliani and Scopelliti, 2009). Below is a brief description of the history and variety of the domain, to illustrate the challenge.

Environmental Psychology is a quite young discipline that has been recognised since around the 1960s (even though several research subjects related to the field have been made before that period) with Sweden, England and the United States as the front runners (Steg, Van den Berg and De Groot, 2013; Küller, 2005). However already here the ambiguity is a fact, as the American tradition appear to regard the origin of environmental psychology as an offspring of the traditional field of psychology (Gifford, 2014a; Gifford, 2014b), while the European tradition often describes it as a field emerged from the studying of the perception and evaluation of architecture and therefore originally labelled 'Architectural Psychology' (Küller, 2005). Hence the discipline has originally emerged in the intersection of different academic approaches (Steg, Van den Berg and De Groot, 2013; Küller, 2005). One of the first influential researches within the field was Roger G. Baker (1968) who introduced an ecological psychology approach. He stated that the study of human behaviour should be conducted in real life contexts (as opposite to laboratory studies), observing individuals and their behaviour in everyday physical environments, which laid the foundation for new methods within people-environment studies (Baker, 1968; Giuliani and Scopelliti, 2009).

With time the field of environmental psychology expanded to not only concern people's relationship with the built environment, but to also focus on interests regarding pro-ecological issues and green environments (Kaplan and Kaplan, 1989; Ulrich, 1984; Pol 1993; Giuliani and Scopelliti, 2009, Steg, Van den Berg and De Groot, 2013). This green direction of the field continues to expand and today an interest in sustainable and ecological issues are greatly on the agenda, as well as the restorative effects nature has on human health and well-being (Gifford, 2014a; Gifford 2014b; Hartig, Mitchell, de Vries and Frumkin, 2014; Bengtsson and Grahn 2014).

Steg, Van den Berg and De Groot (2013) defines the field of environmental psychology as the interplay between individuals and their built and natural environment. Gifford (2014b) uses the same description (only with the word 'transaction' instead of 'interplay'), and enhance that since humans are always finding themselves in a given context and physical place, and since person-place influence is mutual and inevitable, environmental psychology is relevant for all of us, in all aspect of our society, environment and daily lives. The result of this all-encompassing relevance is a field that today cover a wide array of different concepts and topics; from place attachment, crowding and privacy, wayfinding, the effects of noise pollution, to the psychology of climate change, and even the connection between neuroscience and architecture (Gifford, 2014a; Gifford, 2014b; Steg, Van den Berg and De Groot, 2013; Bell, 2001; Bechtel and Churchman, 2002; Zeisel, 2006).

Returning to the focus of this project, the implementation of environmental psychology into architectural design processes, it is not farfetched to imagine that a practicing architect (even if the person has time and energy) might find it overwhelming and difficult to navigate in the jungle of different perspectives and views. Where should the person begin? And how would the person be able to know what knowledge is relevant for the project at hand?

1.2.3 The format of academic research as compared to practice

The creation of design is by its nature a practice-based field, in contrast to the domain of environmental psychology which is rooted in academic research. This foundational difference in approach between the two disciplines seems important to understand when aiming to connect them.

First of all, literature states that the type of knowledge commonly used by practicing architects is of another kind than the knowledge produced in academic research (Kirkeby, 2012; Schön, 1983; Sylvest, 2016; Lawson, 2005). Donald Schön has focused on investigating the relationship between different types of knowledge in his seminal book 'The Reflective Practitioner – How Professionals Think in Action' (1983), and make the distinction between the two types of approaches clear differing between: *'the kinds of knowledge honoured in academia and the kinds of competence valued in professional practice'* (p. 9).

Lawson (2005) describes that the difference between the two approaches is that traditional research tends to focus on understanding underlying rules and processes, whereas designers use knowledge as a mean to find solutions, and hence put focus on the desired result. He states: *'Unlike scientists who describe how the world is, designers suggest how it might be'* (Lawson, 2005, p.112). This difference is further described by Kirkeby (2012), she highlights that in academia, knowledge is traditionally gained in a more passive way, primarily based on lectures and literature, and students are mainly focused on acquiring knowledge produced by others. In contrast, the knowledge of architects is often put in relation to performing a concrete task at hand, and as such manifested in an understanding

of the problem and how it can be solved through a working process. In this case, the architects use a type of knowledge which can not necessarily be addressed without a concrete design assignment to apply it to (Kirkeby, 2012). The working method can be described as a constant learning process, in which competence and understanding is gained through the performance of a task, meaning that they are used to be active participants in the gaining of knowledge - rather than passive recipients (Kirkeby, 2012). While architects learn while doing, they are also reflecting on what they are doing, and through this creating a deeper level of intuitive understanding (Sylvest, 2016).

Kirkeby (2012) found that architects as practitioners are not in general denying their need for new knowledge, but for them the primary path is not through research reports and articles, instead they prefer to invite a researcher or expert out to the practice and gain the knowledge through a participatory dialogue, often about a defined problem in a specific project they are working on at the moment.

Understanding the differing nature of the professional design practice on one hand and the academic field of environmental psychology on the other, it seems clear that some sort of method or strategy is needed in order to facilitate communication and bridge the gap between the two fields.

Lack of time
and resources

The complexity
of the field of
environmental
psychology

The format of
academic research
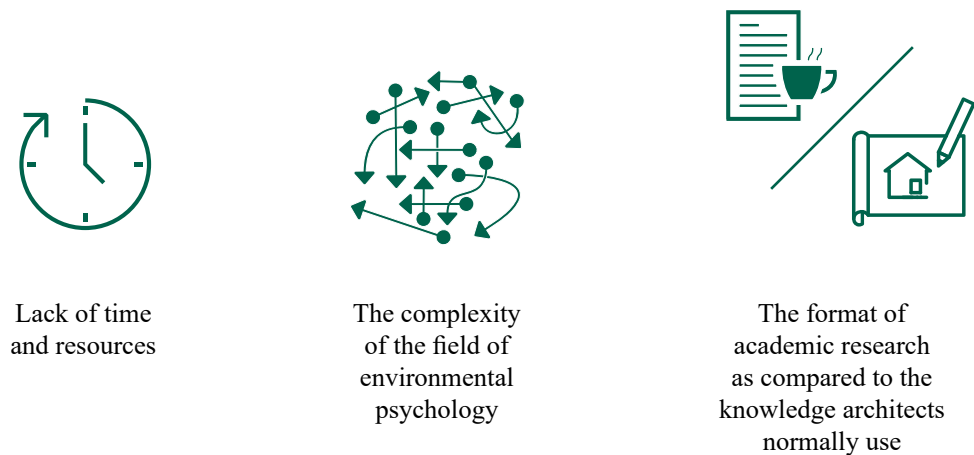as compared to the
knowledge architects
normally use

Figure 1. *Visual overview of barriers between the academic field of environmental psychology, and architectural design practice.*

1.3 Reasons to bridge the gap

Several researchers agree that there is an archive of knowledge within the field of environmental psychology that is currently not being implemented to a satisfactory level in the creation and maintenance of the everyday physical environments in our societies (Gifford, 2014a; Gifford 2014b; Sylvest, 2016; Wener, 2008).

Gifford (2014b) argues strongly that the implementation of academic research from the field of environmental psychology has the potential to greatly improve the environment around us, for instance through a more humane architecture, urban spaces better adapted for the people using them, and by enhancing human relations with the natural environment. He describes it as follows:

> Considering the enormous investment society makes in developing and shaping the physical environment, and the huge current potential costs of misusing nature and natural resources, environmental psychology is key component to human, animal and environmental welfare.
>
> (Gifford 2014, p. 543)

At the same time Sylvest (2016) stresses an increasing demand on architects by clients, developers and users to present evidence of how their designs perform from a user perspective. A complicated situation for architects since they are not trained in conducting research and evaluate their buildings with evidence-based methods (Sylvest, 2016). Others highlight the business opportunities for architectural firms, with research collaborations giving advantages through access to new funding streams, while also being a way to gain reliable information about building performance, and hence to be able to convince existing and potential future clients about the proficiency of the proposed design solutions (Dye and Samuel, 2015; Hamilton and Watkins 2009).

Taking the above mentioned into account, an interest for narrowing the gap between research and practice exist on several levels. Both regarding the improvement of public health and people's general relationship with the environments around them, as well as potential business advantages for private architectural firms, where services better adapted for user needs and sustainability are increasingly demanded.

1.4 Who has the responsibility?

Stating that there is an urge to better incorporate research from the field of environmental psychology in actual design processes, the next question arising is: who has the responsibility for this? Should the academic world be more concerned about making their knowledge and findings accessible and applicable for practitioners? Or is the responsibility on the practitioners to pay more attention to what is going on in research institutions around the globe?

Kirkeby (2012) argues that researchers cannot expect practicing firms to search out and make use of knowledge presented in a format that they are not used to handle. Bengtsson and Grahn (2014) have in their investigation of a quality evaluation tool for use in designing healthcare settings, reflected about environmental psychology theories relevant to the design process of healthcare gardens, and concluded that even when the academical background of relevant theories and evidence is defined - it is not obvious how it should be adapted as guidelines in a design process. Hence, albeit the presence of relevant research, there is a need for translating the knowledge into practice-based use.

Kirkeby (2012) further discuss that research disciplines that aim to deliver insights and results that can support and enrich different types of practices within our society, must address why their knowledge is relevant, and how it can be made useful. She stresses that research ought to be presented in a form that correlate with how practitioners normally gain insights, if it is to be understood and used in actual projects (Kirkeby, 2009). Hence a researcher interested in reaching practicing architects, must understand what kind of knowledge they generally use when designing - to ensure that the research can produce knowledge which feeds directly into the design process (Kirkeby, 2012).

However not all the responsibility lay on the academia world, as described above, architectural firms also have much to gain by incorporating research in their work. Sylvest (2016) stresses the practitioner's role, when she states that: *'informing the design practice thus become an important task that needs to be undertaken from within practice itself, by engaging in collaborative activities with practice-based researchers'* (p. 221). She suggests that the key to incorporating research in practice is to form collaborative activities between practitioners and practice-based researchers. This means that architectural firms must expand their view of 'real work', to also incorporate active reflection and use of research-based input in design processes, and hence put time aside for this.

1.5 How can the bridging be done?

Bengtsson and Grahn (2014) enhance the creation of a quality evaluation tool as a way of achieving evidence-based design, by being able to integrate theories and evidence into an actual design process. Sylvest (2016) also argues in favour of evaluative tools as highly useable for bridging the gap, since they are easy for architects to relate to and interact with, and can fit directly into their way of working.

The main goal of the tools should be to comprise research findings and translate them into applicable understandings. Sylvest (2016) highlights that the tools should be inspirational for the architects, helping them to see possibilities and gain ideas (which they are trained to do), rather than being prescriptive and explanatory. She sees those evidence-based tools as a foundation for architectural practice being able to start to evolve in a more research-oriented direction (Sylvest, 2016).

1.6   Tools as a method

'Unlike scientists who describe how the world is, designers suggest how it might be.'

Lawson (2005, p. 112)

Since several researchers emphasise tools as a possible method to bridge the gap and make theoretical knowledge applicated in concrete design processes of architects (Sylvest, 2016; Bengtsson and Grahn, 2014; Zeisel, 2006), tools as a method is investigated deeper in this Master's thesis.

When examing how a tool can be used as a mean for bridging academia and practice, it seems relevant to relate back to the three main barriers for the interaction between architecture and the field of environmental psychology (described on page 6-9), and how a tool potentially could navigate around each of those obstacles.

The first described barrier is a lack of time, asserting that architects are simply paid for producing designs in drawings and models, making it difficult for them to take pauses, reflect, and integrate new information (Sylvest, 2016; Kirkeby, 2010, 2012). From a logical standpoint, it could be inferred that the tool must therefore be intuitive and time-efficient to use (so that the architects do not feel that engaging with it significantly detracts from their actual production). Secondly, there must probably be a concrete output from the use of the tool, establishing the perceived value of the time invested in it. To address this, the format of the tool presumably needs to be intuitive and graspable, without the need for time-consuming introductions or explanations. Regarding the tool's outcome, it is interesting to note Sylvest's (2016) notion (described in *1.3 Reasons to bridge the gap*) about the increasing demand on architects by clients to present insights into how their designs perform from a user perspective. In line with this, the potential outcome of the tool could be that architects are provided with research-founded arguments for why they have designed as they have – potentially strengthening their credibility when presenting their design proposal to stakeholders.

The second barrier described was the complexity (and, thereby, potential inaccessibility) of the field of environmental psychology for individuals not familiar with the domain. In addressing this issue, a tool is presumably a strong method due to its ability to extract and convey a specifically chosen piece of academic theory. This implies that in the context of sketching architects, instead of grappling with a vast jungle of written research, they are presented with a limited portion of curated and relevant theory through the tool. On top of this, the force of the tool is the way it can translate the theory to be more intuitively comprehensible and relevant for the user group in mind. This leads us to the third barrier.

The final identified barrier concerned the different nature of the two fields. On one hand, the research-based world of environmental psychology, primarily presented in the format of traditional written academia. On the other hand, the practice-based architectural approach of 'learning-and-reflecting-while-doing' (Kirkeby, 2010, 2012; Sylvest, 2016). In this conext, the believed strength of the tool as a method, is the way it can adeptly translate the selected theory to become applicable within the realm of design - making it inhertently relevant for architects.

The tool as a method encompasses not only the selection and curation of theoretical aspects, but a significant portion of its function revolves around communication, specifically regarding how it is framed, formulated and visually presented. Something Kirkeby (2009; 2011) consider to be an important indicator for how efficient it will work as a bridge between academia and practice.

Firstly, on the topic of design tools specifically (though likely applicable to all tools directed towards architects) Sylvest (2016) highlights that they should inspire, rather than force the design in certain directions:

> 'Design tools are easy for architects to relate to and work with. These tools should comprise all the research findings and turn knowledge into understanding. It is important to enable the architect to see possibilities, which is what he or she is trained to do, rather than looking for explanations and description. Thus, design tools should be inspirational rather than prescriptive.'
> (p. 234)

This approach is also advocated by Lawson (2005), who asserts that prescriptive tools aimed at evaluating design do not universally enhance design standards; in fact, they might yield counterproductive outcomes. Given the intricate nature of design, highly related to project specific circumstances and objectives, a tool that dictates might lead to a lack of adaptability and sensibility for diverse contexts. Instead, the tool should provide a flexible input, that supports the architects to reflect and gain new knowledge through their engagement with it. In this way the tool has potential to support the designers to make new discoveries, and hence become small investigators themselves. Schön (1983) describes it as follows: *"When someone reflects-in-action, he becomes a researcher in the practice context"* (p. 68)

Kirkeby (2012) describes how architects prefer to gain new knowledge by inviting an expert out to the practice and integrate their knowledge over a dialogue, directly related to project specific aspects that the architectural team are working on at the moment. Parts of Kirkeby's notion, could potentially be translated to the development of a tool. By designing the tool in a way that makes it applicable directly to a specific design project, it could perhaps function a little bit similar to an expert from the field of environmental psychology coming out to the practice.

Within the literature review, several supplementary recommendations for the

structure of tools designed for practicing architects are identified. Sylvest (2016) highlight that architects commonly operate in team-based structures, underscoring the necessity for the tool to adopt a format tailored to these dynamics, such as facilitating engagement through dialogue.

Another aspect is addressed by Lawson (2005), who describes that use of narratives might be a way to introduce architects to the consequences their design has on the users of it. By this, he refers to a design-team telling a story about fictive 'characters' from the user group(s) of the building, which can be used to link together the main features of the design (Lawson, 2005). The stories help architects imagine the building from the perspective of the user groups; 'including the 'roles' they play and the 'rituals' in which they are set' (Lawson, 2005, p. 205). A bit in line with this, Kirkeby (2009, 2011) suggest providing concrete examples (for instance case-studies or personal experiences), to increase the understanding of research findings in relation to potential relevance for the user group of architects.

Ziesel (2006) describes how architects prefer to use sketches, drawings, models, and photos as tools to externalise and communicate their internal images and ways of thinking. In line with this, Kirkeby (2009, 2011) highlight how graphic representations of research findings are meaningful for architects to relate to theoretical concepts. Consequently, the tool could potentially derive advantage from incorporating visual illustrations when introducing architects to the theoretical principles they are meant to engage with. Moreover, a layout supporting sketching as a technique to use, for the architects navigating through the tool, might support actively participating.

Here below is a summary of aspects that should be considered when creating a tool for sketching architects.

Summary - Essential traits of a tool for sketching architects
Guidelines found in the literature review indicate that the tool should:

• Tailor research-based knowledge to be relevant for the specific user group of architects
• Make use of graphical illustrations to visually communicate theoretical concepts
• Foster ease of use (avoiding long introductions and similar)
• Offer tangible examples of how the theoretical aspects can be relevant in practice
• Facilitate direct application to the architects' current project at hand
• Cultivate inspiration, avoiding dictation and nurturing design possibilities
• Pose open-ended questions encouraging architectural exploration via environmental psychology
• Align with architects' accustomed formats, compatible with drawings, sketches, and models
• Harness narratives to illuminate design impacts on users
• Adapt for team collaboration, centred around dialogues

1.7 The architectural design process

Considering the tool as a method related to architectural practice, it seems vital to provide a bit of understanding of the characteristics of a typical design process. That being said, research indicates that the design processes of architects are difficult to grasp and explain, since they are not linear from start to goal, but instead rather dynamic (Lawson, 2005; Zeisel, 2006).

The typical architectural design process can be seen as a multitude of aims and challenges, that needs to be addressed and resolved through various design solutions. Zeisel (2006) illustrates it as a spiral procedure, which proceeds through an iterative process of constant adjustments and testing. He (ibid) outlines the presentation of design solutions in the form of drafts—often visual representations such as drawings, diagrams, or visualisations—subsequently subjected to testing. The testing process typically entails the architect presenting the idea within a forum comprising fellow architects (often extended to include clients and other stakeholders). Hereafter, participants assume a critical stance, evaluating how effectively the proposed solutions addresses the design objectives and challenges at hand. In response to feedback collected from this assessment, the architects engage in an iterative process of revising, refining, and reconsidering their solutions. This process inherently involves exploring different paths and further knowledge create loops, where one constantly returns to an activity preceding it, in order to adjust or change it in line with new understanding and insights. Zeisel (2006) refers to this aspect of the process as 'backtracking' and states that *'In sum, backtracking to adjust earlier decisions is an integral part of design'* (p. 30).

This working method embodies a certain inherent repetition in itself, while the design ideas on the other hand undergo a continuous and unpredictable evolution. In line with this, Zeisel (2006) describes how different aspects of the design are being examined in several repetitive cycles through the design process, while the focal content constantly shifts to encompass various dimensions of the design. Whilst normally starting with a focus on larger aspects (such as for instance the volumetric concept and placement of functions) the loops gradually become more and more focused on precise details (such as for instance materials and the colours of the walls) (Zeisel, 2006). Occasionally, the whole process takes a huge step backward with new information coming at the table (for instance if the calculation of a chosen concept reveals that the suggested design solution is way more expensive than predicted). Hence the process is dynamic, and many of the design solutions are up for discussion and can be re-examined with short notice, creating new loops in different directions. This workstream continues until the deadline of the project, described by Zeisel (2006): *'Backward movement, repetitions at different levels, and progressively linked cycles combine into one movement toward the goal of an acceptable response.'* (p. 31). Or as my own professor at the Architecture school in Aarhus used to say to us students: *'there exist no such thing as a finished design, there are only deadlines'*.

2. Aim

The aim of this Master's thesis is to enhance the understanding of how research from the field of environmental psychology can be effectively integrated into architectural design practice.

Specifically, this will be done by developing a translation tool based on theory from the field of environmental psychology, tailored to sketching architects. The initial version of this tool will undergo testing through a pilot study at an architectural studio, followed by an evaluation of its effectiveness in translating knowledge from environmental psychology into practical architectural work.

The primary objective is to attain insights and comprehension concerning the implementation of academic research within architectural design processes. Taking a broader perspective, this effort aims to empower architects to create designs that are more informed from the standpoint of human health and well-being.

3. Method

In order to explore the aim of this Master's thesis, a method was chosen that focused on the development, testing and evaluation of a translation tool. This method was selected because it was viewed to be close to the type of real-life situations, for which the research question of creating a bridge between academia and architectural practise is aimed. The project has been executed across multiple stages, each of which is elaborated upon below. A visual overview of the entire methodological process is presented on page 24.

3.1 Part A. Theoretical foundation and translation

The first step of the process to create a translation tool draft, was to select which theoretical concept from the field of environmental psychology it should be based upon. Following this, the focus shifted to reviewing various aspects of the concept and extract elements relevant to the world of sketching architects. Subsequently, the process of translating the selected piece of theory into a language aligned with architectural practice was initiated. Further elaboration on these steps is provided in the subsequent section.

3.1.1 Choice of theoretical concept

When searching for a suitable concept to base the translation tool upon, it was considered essential to find a basic theoretical concept which exemplifies the field of environmental psychology in a representative way. The objective was to select a concept widely acknowledged within the field, thereby minimsing any potential doubts about its relevance.

Additionally, a preference was given to a concept perceived as versatile in its potential application, making it useful across various architectural scales and design stages. A concept that met these criteria and was further recognised as particularly relevant for architects was the concept of *Affordances*. More about its relevance is described in the result chapter on p. 29.

3.1.2 Sampling

The sampling procedure was conducted by searches across scientific literature databases online. The search was intentionally broad, in the sense that research articles about affordances was not limitied to papers where the concept was being applied within the architectural domain. For instance, certain articles delved into affordances between individuals, such as interactions between doctors and patients in a hospital setting (Jensen and Pedersen, 2016).

Maintaining the breadth of the literature search was considered relevant, as a substantial body of knowledge from the field of environmental psychology holds

potential relevance for architects, even though it has not (yet) been explicitly contextualised within the realm of architecture.

Nonetheless, it is important to note that the literature review was constrained in terms of scope and time. It should not be regarded as an exhaustive mapping of the concept of affordances pertinent to sketching architects. Instead, it focused on capturing a sample of conceptual aspects. The review concluded once a sufficient amount of theoretical material to base a translation tool on was obtained.

3.1.3 Translation of the theoretical concept

The literature review started a process of working with the material to make it more accessible and manageable for the user group of practicing architects. Reviewing the research articles, the focus became on grasping the essence of the various approaches to the concept of affordances and relate the knowledge to the world of designers.

Throughout this process, four overarching perspectives on the concept of affordances were identified. These naturally evolved into a framework for structuring the theoretical underpinning of the translation tool. By categorising the concept into four main groups—Functional Affordances, Cultural Affordances, Social & Communicative Affordances, and Affordances for Sociality—the intention was to provide the sketching architects (many of whom will probably encounter the concept of affordances for the first time) with an intelligible overview.

Further, to facilitate an instinctive understanding of the defined categories, a diagrammatic representation was created for each one of them. Given architects' inclination to engage with visual imagery as a means of communication (Kirkeby, 2009, 2011), this approach aimed to enhance the accessibility of the categories. The outcome of this phase is presented in the result chapter on page 28.

As a final way to translate knowledge from the literature review to the world of practicing architects, aspects particularly relevant for designers were exemplified. This methodology aimed to furnish practical inspiration, indicating how each theoretical facet could hold relevance and applicability within architectural design. A number of these insights were visualised, showcasing real-world examples of the concept in use (such as for instance demonstrating functional affordances in relation to a staircase, see p. 32).

The translation exercises detailed above formed the foundation upon which the tool itself was crafted, providing the essential theoretical base for its content. It is important to acknowledge, however, that the translation methods discussed in this chapter have transitioned the project's focus from a more objective and scientific standpoint to a more subjective and practice-oriented approach.

The process of translating selected segments of academic knowledge into categories, illustrations, and real-life examples inherently involves a subjective manner of working. In this context, I drew upon my own experience as a practicing architect for over a decade, coupled with my additional education in environmental psychology. I considered myself being reasonably qualified to extract and translate research literature relevant to the target group of practicing architects. Nevertheless, it is crucial to recognise that this subjectivity present challenges from an academic standpoint, an aspect that is further elaborated on in the discussion chapter .

3.2 Part B. Development of a translation tool

After translating the theoretical knowledge from the literature review, the actual process of creating the tool draft began. This development naturally unfolded through the three steps described in this chapter.

3.2.1 Step 1. Overview of the user groups and their needs

Following the literature review it became evident that the translation tool should be applicable to the architects' current project at hand, and capable to provide insights directly related to this. Therefore, the development of the translation tool was built upon the assumption that architects, while engaging with the tool, would have a specific design issue or project to which they could apply it. This also meant that it would probably be possible to have specific user groups in mind while engaging with the tool.

Regarding the starting point described above, it seemed logic that a first step in the translation tool should be to get an overview of the goals, intentions, and abilities of the individuals who will experience and use the affordances that the architects' design. Therefore, the translation tool began with an initial step encouraging them to define and reflect upon the future users of their ongoing project. This initial definition of core users, could then be the foundation, informing the architects' discussion in the further engagement with the translation tool.

In practical terms, this meant that a large canvas was created in Adobe Illustrator devising a user group mapping scheme. A couple of different layout options were experimented with before arriving at the final design. The outcome of this process became Step 1 in the translation tool, a user group matrix, which is visually presented in the result chapter on .

3.2.2 Step 2. Working with affordances

Following the first step, the user group mapping, the next natural step was to pair this understanding with the concept of affordances. As previously described, the translation process created an overview of the affordance concept, with four defined main categories. Those became the structural starting point for step 2 in the tool. However, the comprehensiveness of the various angles of the affordance

concept meant that it did not seem realistic, or even desirable, that all the angles should be covered by an architectural team engaging with the translation tool.

Building upon this insight, the development of the translation tool focused on creating a layout allowing the architects to select the specific angles of affordances, most relevant for the project at hand. This choice of relevant theoretical focus is likely to depend on the project's typology, user groups, and how far in the design process the group of architects finds themselves.

Keeping this in mind, the idea of developing a collection of independent worksheets emerged. Essentially, a worksheet is a page that specifically addresses one single aspect of the affordance concept at a time (for instance 'affordances for restoration'). The intention being that the architects can interact with the tool with a more defined focus, exploring theoretical aspects one by one. In the draft of the translation tool, each worksheet was termed a 'lens', signifying its role in examining the project from a particular perspective.

The idea behind the lenses was also to make it possible to customise the translation tool for each project in focus. Meaning that different groups of architects should be able to mix and match the lenses, focusing on the topics they consider to be the most relevant for their specific project and current challenges.

The next question was how to structure and design each lens sheet. In addressing this, findings from the literature review were drawn upon in terms of format, layout and presentation of the theoretical content. In the background chapter a list of essential traits of a tool for sketching architects was created (see p. 14), this insights was translated into a graphical layout providing open ended questions to kickstart a discussion, illustrative examples of the conceptual angle used in building practice and enough space for the architects to sketch directly on the sheet. Using Adobe Illustrator, the design of the lens sheets was crafted, and the final layout is showcased in the result chapter on p. 48.

3.2.3 Step 3. Summarising the findings

The importance of a concrete outcome was highlighted in the introduction of this Master's thesis, and therefore considered vital in the tool development. The goal being to provide the architects with insights and ideas ready to be implemented in the further design process.

Therefore, the final step of the tool was about gathering insights from the two previous steps, into a helpful summary for the architects to use when moving forward with the project. For this purpose an 'implementation canvas' was created based on the layout of the lens sheets. The idea was that the architects on this sheet should themselves in the format of notes and sketches, define their key take aways and summarise ideas and design guidelines they wish to bring further.

3.2.4 Introduction pages and manual

Since the translation tool now consisted of three different steps, it appeared necessary to provide a small introduction to it. The intention was to explain the structure of the tool with a visual diagram, providing a quick and intuitive understanding of it (presented in the result chapter p. 46). Further, some of the illustrations and examples crafted during the translation process, was used to offer a brief introduction to the concept of affordances, before encouraging the architects to delve into the tool itself.

3.3 Part C. Testing the tool draft

Testing the draft of the translation tool within the practice of an architectural design office was a crucial step of this Master's thesis. Prior to conducting a pilot study involving a full design team, it was considered appropriate to carry out an initial pre-test of the tool draft with a single participating architect.

Both the pre-test and the subsequent pilot study took place in December 2021 at an architectural office in Copenhagen, where I am presently employed. The selected participants comprised architects from two different departments outside of my own. The full procedure is outlined in the following section.

3.3.1 Pre-test

The initial version of the tool was trialled on a fellow architect and colleague of mine. At the time of the pre-test, he held seven years of experience in building design. Notably, the participant had no prior exposure to the field of environmental psychology. The draft of the translation tool was informally managed by printing out its sheets and arranging those on a table in front of him. In this casual setting, he was instructed to methodically navigate his way through the tool while I sat beside him, observing and ready to address any queries that might arise.

The participant used the tool on his ongoing project, and provided spontaneous feedback regarding his experience while progressing through the three steps. The comments primarily revolved around seeking clarification on the research and the themes presented in the lens sheets. He found it straightforward to apply the research concepts to his ongoing project and expressed that he found the input both relevant and inspiring.

However, my prescence next to him meant that I was readily available for discussion and therefore easily became part of the ping-pong when he started considering the themes in the lenses, and what those could mean for his project. In this way, there might have been some interference. Following the pre-test, some adjustments were made to the tool draft, primarily involving textual changes, before the pilot study was conducted.

3.3.2 Pilot study

The pilot study took the form of a 1.5-hour workshop held at the selected architectural office in Copenhagen. Within this session, a design team systematically worked their way through the draft of the translation tool.

Preceding the pilot study, I communicated with a few responsible partners at the architectural office, requesting their assistance in identifying a suitable project and team for testing the translation tool. Subsequently, the partners provided me with a proposed case.

The selected design team consisted of six individuals, with three of them agreeing to take part in the trial. Among them were two sketching architects (with 1 and 3.5 years of work experience, respectively) and an architectural intern. The office has an international workforce, which was also mirrored in the participants' diversity, with one member originating from Sweden, one from Greece, and one from Canada. The pilot study was conducted in English, which also matched the language used on the tool sheets.

Before the pilot study, I had given the architects a short description and asked if they were interested in participating. I had also asked them to agree within the design team on one specific area of their ongoing project that they wanted to focus on in the pilot study. They were currently working on the refurbishment of a luxury hotel in Switzerland, and they chose to concentrate on the main entrance and reception desk.

The pilot study took place in a closed meeting room at the office. It began with a brief introduction to explain the purpose of the study.The participants were informed that the workshop was voluntary, and that they could choose to leave at any point if they wished so. Next, I provided a short explanation of the purpose of the translation tool, the concept of affordances, and why it is suggested to be relevant for architecture. The various tool-sheets was printed and laid out on the table in front of the group. Hereafter, the team moved through each of the three steps of the tool.

My initial role, during the workshop, was envisioned as that of an observer, but ended up being more of a facilitator's role, guiding the team through the various steps of the tool. A more detailed account of how this played out, can be found in the result chapter on p. 50.

3.4 Part D. Evaluation of the tool draft

When the pilot study was conducted, the final part of the process began: the evaluation of the design tool. This phase had three primary objectives. First, it was crucial to understand how the participating architects perceived the tool as a working method, and how accessible it was for them to engage with. In line with this, it was also important to understand how they perceived the theories from environmental psychology to work with.

Secondly, it was important to gain insight into the participants' impressions of the extent to which the translation tool influenced the further development of the area in focus. Meaning to review the outcome of the translation tool in regards to its influence on the actual architectural project.

The final aspect concerned the reliability of the tool's outcome from an environmental psychology perspective – in other words, how well the design suggestions generated by using the tool aligned with the theoretical concept of affordances as presented in the literature review.

To adress the three objectives described above, the evaluation was conducted through four methods. Firstly, I made observations during the pilot study as it unfolded and recorded my impressions after the workshop. Secondly, at the end of the workshop, all participants were collectively asked to provide their spontaneous feedback on their experience of working with the translation tool. Thirdly, one week after the workshop, each participant was individually queried about their reflections and whether they believed the workshop had impacted the design output or not. Finally, the pilot study culminated in a tangible list of design suggestions, which I evaluated based on their alignment with the theories of affordances presented in the literature review. The results of these evaluations can be found in the result chapter, starting from page 54.

A visual overview of the methods and the overall process of this Master's thesis is illustrated on next page.

Part A
Theoretical Foundation & Translation

- Literature review on the concept of affordances
- Translation of relevant knowledge to the focus group of sketching architects through illustrations, overviews and extraction of the essence

Part B
Development of a Translation Tool

- Creation of a complete tool draft, based on findings from Part A

Part C
Testing

- Pre-test with a single architect participating
- Pilot study involving a group of sketching architects at an architectural design office

Part D
Evaluation

- Observations during the pilot study.
- Collection of group feedback at the end of the pilot study
- Individual follow-up with pilot study participants a couple of days later
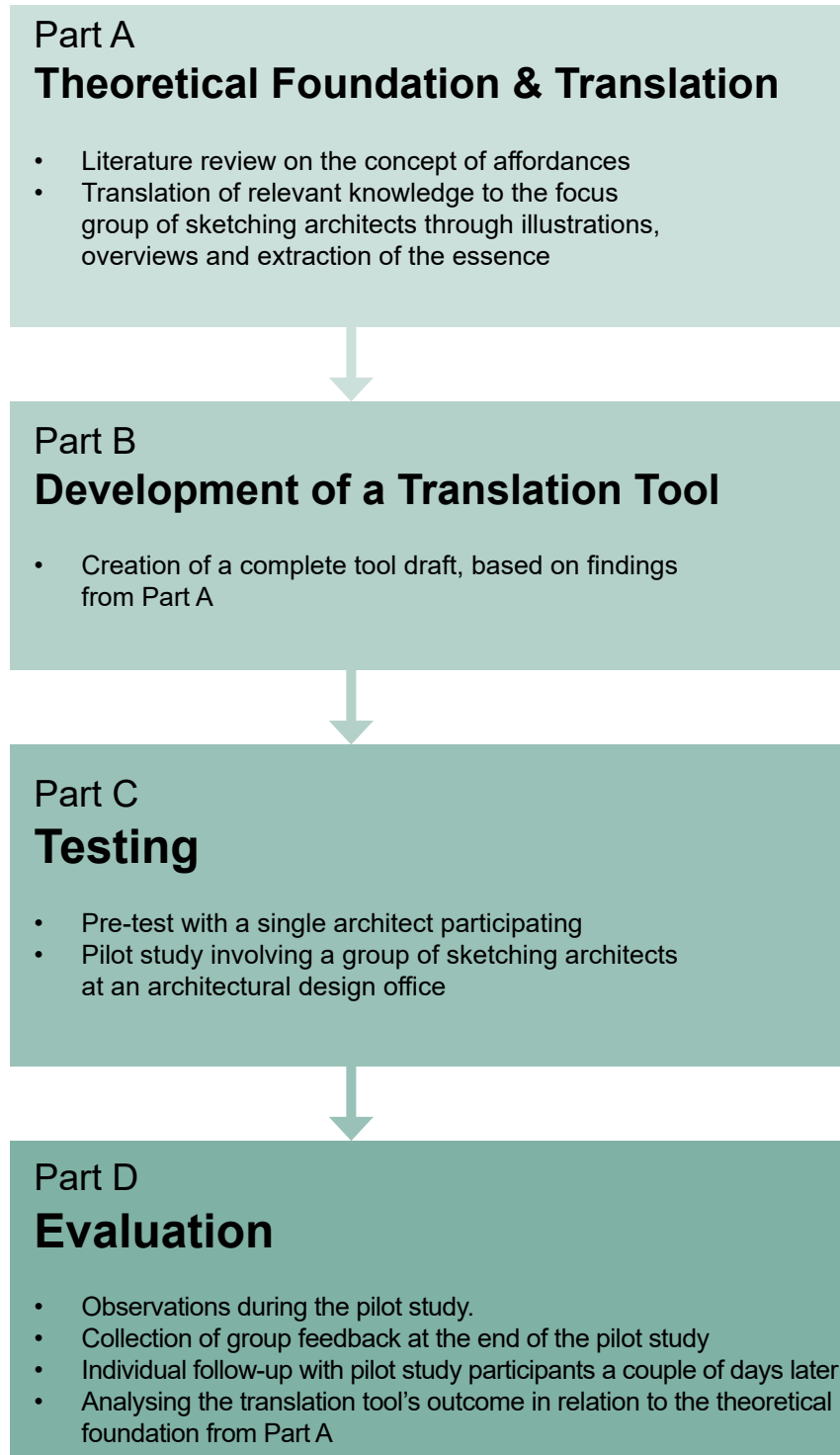- Analysing the translation tool's outcome in relation to the theoretical foundation from Part A

Figure 2. Visual overview of the process of this Master's thesis, and the various methods employed.

3.5 Ethical considerations

One essential ethical aspect to consider during this research project was the involvement of architects participating in a pre-test and a pilot study. Codex (2017) states that research involving individuals place the responsibility on the researcher to inform the participant(s) about the research project and its implications. Additionally, it is crucial for the researcher to ensure that participants are aware of their voluntary participation and have the choice to decide whether they wish to take part or not (ibid).

Caution was taken during both the pre-test and the pilot study. Initially, I obtained permission to conduct the studies from two of the partners in charge at the architectural office. They provided me with a pre-test participant and a potential project-related case, involving a design group of six individuals. The workshop was presented as a voluntary offer, enabling all interested architects from the design group to opt for participation, of which three chose to do so. Prior to the workshop, participants were provided with information about the research project, its objectives, and the workshop's focus.

The workshop occurred in a closed meeting room, ensuring acoustic privacy. The pilot study commenced with participants being briefed. They were informed that the interview aimed to gather data for a Master's thesis at the Swedish University of Agricultural Sciences, that participation was voluntary, and attendees were free to exit the workshop at any point without providing a reason. The subject matter of the pilot study was not inherently private or intimate; otherwise, more extensive ethical considerations would have been necessary. The workshop was not recorded but solely documented through my written observations.

Collected research data, in this case, consisted of my notes. Individual evaluations afterwards were conducted orally by two participants (and noted down by me), while one participant provided written comments. The comments have been compiled into a text document, with code names assigned to the participants, and their original emails have been deleted. Moreover, I sought permission from the participants to include their quotes in the thesis.

However, the research method is somewhat sensitive in this case, as the company's partners are aware of which employees took part in the studies. As detailed in the results chapter, all participating architects viewed the pilot study as a 'safe space' where everyone's opinions could be expressed. This could potentially have led to the discussion of more sensitive information, raising ethical concerns about what research data I could include. Although no such issues arose in this study, it highlights a potential risk associated with the method itself.

Another consideration is the fact that I work at the office where the tool was tested, which brings forth two points of awareness: the potential impact of the study's results on my professional standing at the office, and the fact that I am conducting the study with my colleagues.

Addressing the first concern of potential bias, it is crucial to clarify that the outcome of the pilot study did not have a 'right or wrong' answer, nor any influence on my position within the company. There are no incentives for me to emphasise any strength of the translation tool, nor downplay weeknesses, that could conflict with the result of this study.

Regarding the second concern, given that the topics discussed were not of a sensitive character, and the participants were colleagues from other departments, with whom I do not usually collaborate with, the situation was regarded to be 'sufficiently objective' for the purpose of this Master's thesis.

4. Result

In this section, the results of each of the four parts described in the previous method chapter is examined.

4.1 Part A. Theoretical foundation and translation
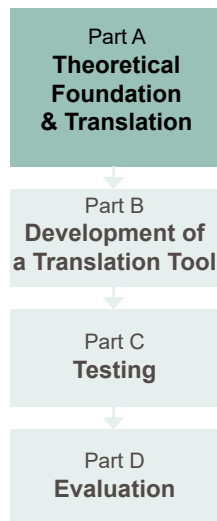
Figure 3. The initial section of the result chapter will detail the outcomes of the literature review and the translation of the findings into a format tailored for sketching architects.

Part A of the project offered hands-on experience in translating academic knowledge from the field of environmental psychology into a language more suited for practical application. As detailed in the method chapter, the process involved defining four overarching categories of the affordance concept, that later became the foundation of the translation tool.

This chapter begins with a summarised presentation of the four established categories, accompanied by visual interpretations. Following this, each category are being unfolded. This process starts with a traditional literature review, followed by a more 'subjective' translation. The last part highlighing aspects of the theory that is thought to be relevant for sketching architects, and occasionally an illustration exemplifying the theoretical concept in practical usage.

The result from this chapter, Part A, is what became the theoretical content of the translation tool, and hence the foundation for Part B.

Overview of the four defined categories of affordances

Functional Affordances
Describes an individual's contact and interaction with the surrounding physical environment.

Individual — Physical Environment

Cultural Affordances
Describes how an individual's interaction with the surrounding physical environment are also part of a socio-cultural context.

Culture and norms — Individual — Physical environment

Social & Communicative Affordances
Describes the possibilities for interaction that other people afford us.

Individual — Individual

Affordances for Sociality
Describes how the shared physical environment affects social interaction between individuals.
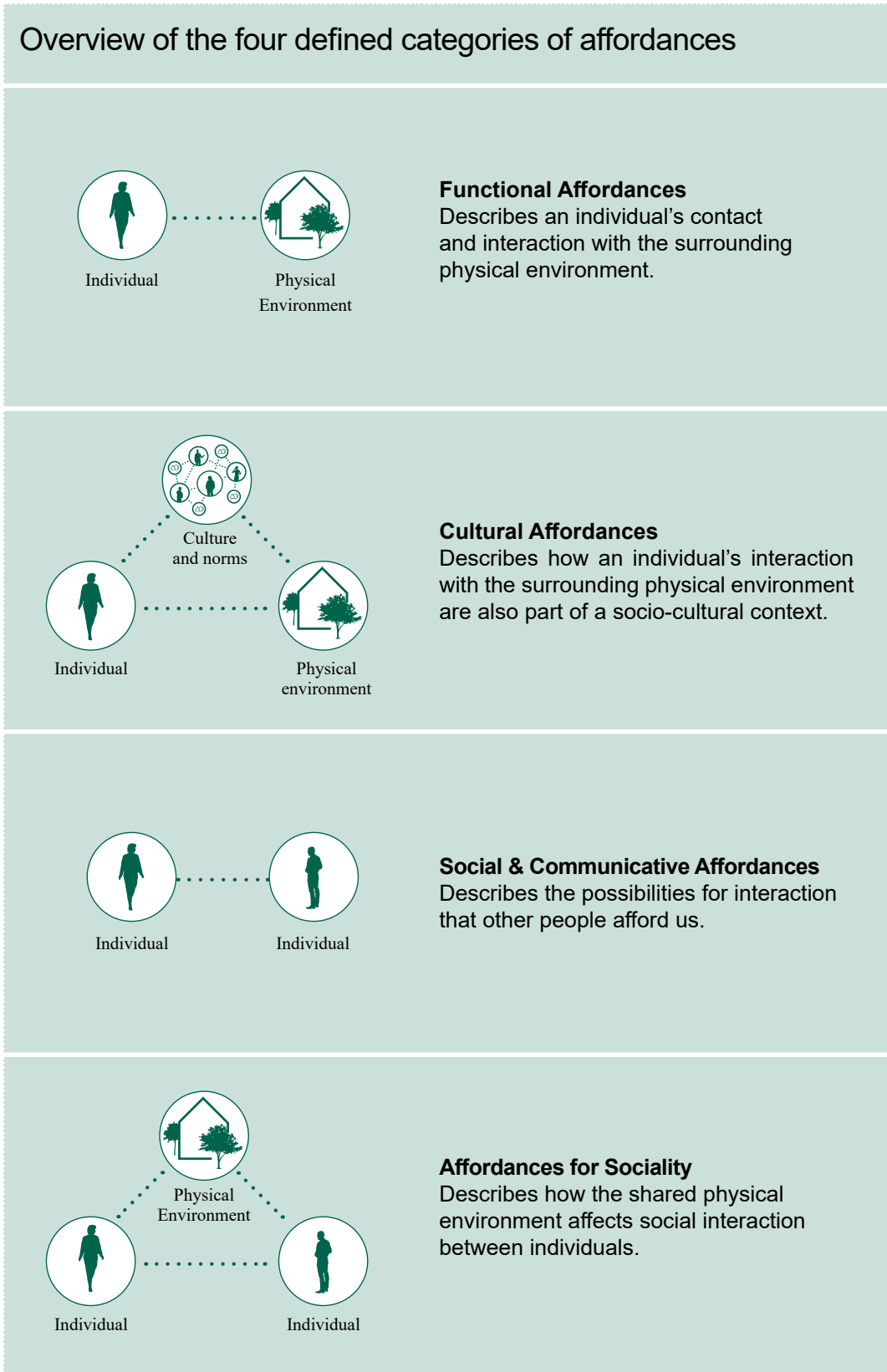
Physical Environment — Individual — Individual

Figure 4. Visual overview of the findings from the literature review. Illustrates how the concept of affordances is being organised into four main categories.

4.1.1 Why affordances is relevant for sketching architects

In the method chapter, the importance of selecting the appropriate theoretical foundation for the translation tool was discussed (see p. 17). Consequently, the selection of the concept of affordances will be further detailed within this section. Affordances provides a conceptual framework that Maier and Fadel (2009) argue is highly relevant for architects. They (ibid) emphasise that it has the possibility to provide understanding of the relationship between the environments and humans, especially with a focus on the connection between form, function and meaning of architectural elements. They argue as follows:

> As to architectural theory, affordances can be used as a conceptual framework to understand the relationship between environments and occupants, especially with respect to form and function. Regarding architectural design, the concept of affordance allows for a common theoretical basis to improve the design process. Concerning architectural practice, affordances can be used as a tool to explore the connection between the intentions of the design with how the artifact is actually used, leading to archived knowledge, and the potential for avoiding common design failures.
>
> (Maier and Faidel, 2009, p. 393)

Maier and Fadel (2009) further describes how affordances can be relevant for architects working on all different scales, from urban planning and large building complex, down to smaller details such as the layout of a door handle. It has a general applicability that can help explain why and how users behave the way they do (Maier and Fadel, 2009).

Within the field of environmental psychology several researchers have argued in favour of the relevance of the concept. Grahn, Stigsdotter, Tenngart-Ivarsson and Bengtsson (2014) states in 'Using affordances as a health-promoting tool in a therapeutic garden' that affordances play an important role in the environment's ability to promote health, and provide understanding of the user experience. Kyttä (2003; 2004) and Sylvest (2016) both describes how the concept of affordances can be used to comprise social and cultural opportunities offered by the environment. For instance, Kyttä (2003, 2004) uses a concept she identifies as 'affordances for sociality' in her studies of childrens outdoor environments, regarding a focus on how the physical environment becomes a resource in the interaction between several individuals. Hence the concept of affordances can be considered relevant on many aspects, from concrete form and function, to designing for social interaction between people.

4.1.2 Introduction to the concept of affordances

Before diving into the defined categories of affordances, it seems relevant to present a more general introduction to the overall concept. Affordances has its root in the field of ecological perceptual psychology and was first put forward by James J. Gibson (1979). It was originally a theory created to describe the

perception of the environment, with the basic idea that animals through their perception search for certain characteristics in the environments that can afford them in various utilities, for either good or ill (Gibson, 1979).

With time the concept of affordances has been expanded to a wide array of aspects, focusing on humans, and our interaction with the surrounding environment. Foundationally the concept describes how things in our everyday are perceived to us as functionally meaningful units, supporting actions and activities (Kyttä, 2003). The idea is that everything around us afford different doings (an object can be grabbed at, lifted etc.; a surface can be run on, climbed on etc.), and that we are active agents using our perception continuously to explore the functional possibilities of our environment (Kyttä, 2003).

What makes affordances so interesting in a psychological context relating to architecture, is the way it philosophies about the relationship between us as humans (with our complex internal cognitive minds), and the material and social world outside. In line with this Kyttä (2003) describes her fascination for the idea of affordances, based on the fact that the concept only exists in a person-environment system. She portrays it as follows:

> Affordance refers to both the perceiver and the object of perception simultaneously, so affordance is a relational concept. The affordance is situated between the individual and the environment without being a characteristic of either of them alone.
>
> (Kyttä, 2003, p 47)

Another advantage in line with this, is that the concept of affordances focuses on perception as whatever is meaningful for a specific individual, and as such not desired to be "objectively real". This illustrates in Alan Costall's reflections about the relevance of affordances in relation to western psychological culture, where a largely accepted view is that there exists a gap between the world as it 'really is', and the world as we perceive it (Costall 2012; Costall and Richards, 2013). Arguing that we as humans cannot step out of our perception and experience the outside world with objective reality. The traditional explanation for this, is that our senses and perception is limited in the way they perceive and interpret the world, and that a lot of what we believe and experience, is not real as such, but a mental projection (Costall, 2012). Costall and Richards (2013) here argues that one of the strengths with Gibson's concept of affordances is that it addresses this dualism of the objective and subjective – the physical world and the mental world. The concept considers 'use-meanings' (meanings for the satisfaction of needs), which are argued to be – from a biological perspective – more central than the actual objective physical properties of a certain object (Costall, 2012). This means that affordances are to a high degree relational, which is why the concept can help undermine the traditional view of a dualism between the subjective and objective world, and instead in a meaningful way investigate the relations and actions between the two (Costall, 2012; Costall and Richards, 2013). Related to an architectural design process this is relevant input as a perspective of how to view the relationship between a space and the different users of it.

As can be seen in this introduction, the concept of affordances is both to some extent quite concrete and 'hands on' (such as 'an object can be grasped'), and at the same time also philosophical and abstract by its nature (such as an idea to understand the duality between the objective world and the subjective viewer of of it). The complexity of the concept is indeed described in the literature. Costall (2012) and Sylvester (2016) both underlines how the concept of affordances gives rise to a large amount of confusion, as it is wide and sketchy – with possibilities for a lot of different interpretations and fields of application, some quite far away from Gibson's original thoughts.

In order to create a theoretical basis for the translation tool, this literature review aim to describe and organise a selection of key aspects from the concept of affordances, as well as to perspective and translate those into useful and tangible aspects for sketching architects to engage with during a design process.

4.1.3 Functional affordances

'Perception can be understood as openness to affordances'
(Rietveld and Kiverstein, 2014 p. 347)

The main entry angle of affordances refers to the traditional view of the concept as existing in an individual's contact with the material outside world. Meaning the way our perception searches for certain characteristics in our environment that affords us various utilities. The angle is framed in diverse vocabulary, for instance Loveland (1991) categories this aspect as 'affordances for physical transactions with the environment' and Kyttä (2003) refers to them as 'functional affordances'.

Foundationally the affordances an environment offers depend on the abilities of the person (or animal) interacting with it (Rietveld and Kiverstein, 2014). The agent's corporality (what type of skills the person has), as well as the goals and intentions of the individual is what determines the interaction with the surroundings (Kyttä, 2003). As human beings in general have a high level of ability, both physical and mental (advanced cognition), our physical contexts around us are usually perceived as highly resourceful, and consequently the concept of affordances are considered broad and diverse (Rietveld and Kiverstein, 2014).

The connection between the perception of affordances and the abilities of an agent, is very well illustrated in the development of children, that through their growth gradually discovers affordances and hereby gain more and more understanding of the world (Loveland, 1991). For instance, a whole new world of affordances will open up to a small child that learns to walk (Gibson and Schmuckler, 1989). While the skills and bodily qualities develop, the children get more experiences of being active agents in the world, and hence the affordances

they perceive will grow, as will their intentions (Loveland, 1991; Kyttä 2003). As a consequence of this, Kyttä (2003) describes how the affordances of a playground appear different for each individual, as well as for the same individual over time. The affordances of the playground are thus 'waiting' to be actualised in different ways. In this process, an individual will gain a catalogue of experiences, which naturally expand the perception of affordances, creating a more and more rich surrounding world (Kyttä, 2003). Kyttä (2003) describes a very concrete example: '…the ability of Finnish children to perceive affordances in snow, to realise they can make snowmen, ski, or walk on snow is connected to their experiences of activity in winter environments' (p.44). With time the child can even shape new affordances, for instance build a snow igloo which hereafter affords hiding or playing roll games (Kyttä, 2003).

The individual dependent experience of the world is also addressed by Maier and Fadel (2009), who describes how affordances work different for persons in diverse user groups, as well as how it may vary for individuals within the same user group. Hence the architects designing our surroundings should evaluate their design through both of those aspects.

Having the purpose of communicating the concept of 'functional affordances' into the translation tool in back of the head while doing the literature review, two visual figures were created. One with the purpose of illustrating the concept in a graphic way, since architects are used to gain and relate to visual information (Kirkeby, 2009, 2011). And one, explaining the concept with a concrete example, to make the subject more tangible for the target group of sketching architects.
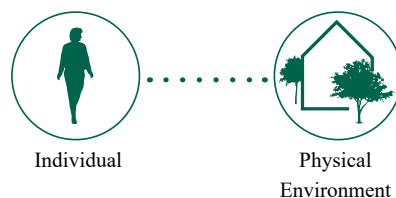

Individual   Physical Environment

Figure 5. Functional affordances concern the relationship between an individual and the physical environment.

Figure 6. *Example: What a stair affords (or not) to an individual depends on the person's abilities, goals and intentions.*

Another exercise within the literature review was to translate how the knowledge could be relevant for sketching architects (this is more closely described in the method chapter at p. 18). Throughout this chapter, the specific result in relation to the sketching architects is summarised in boxes, like the one below.

Functional affordances
Relevant aspects for sketching architects

For architects the theory of functional affordances can provide a better understanding of how their design can support an individual, taking that persons abilities, goals and intentions into account.

• What are the abilities, goals, and intentions of the building's users? For instance, something designed for families should afford important aspects for children (of different age groups and abilities), as well as diverse types of caretakers. How can the design provide affordances that supports the defined and diverse needs?

• Is it possible for an agent using the building to customise and shape new affordances? For instance, to build something that can then afford a role-play or other engaging activities.

4.1.3.1 Functional affordances - solicitations

While functional affordances come in a multitude in a given environment, it is our concerns at the moment, that directs our perception, and makes us drawn to act upon one affordance in front of another. Rietveld and Kiverstein (2014) therefore highlight the relation between affordances and solicitations. As they (ibid) describe it: *'Moreover, once we have available the notion of a solicitation, we can also recognize how sometimes the world can motivate us to act in certain way' (p. 342).* This aspect is relevant for architects, because it can help influence a desired behaviour among the users, by creating design that invites the users to act in a certain way. A concrete example can be to invite people to make use of outdoor areas in relation to a building, by providing facades that can be opened up, and as little difference in levels between the indoor floor and the outdoor ground as possible - to make it highly inviting and effortless to move outside.

Functional affordances: Solicitations
Relevant aspects for sketching architects

• Are there some essential aspects of behaviour the project would like to motivate? How can the affordances be designed in a way that solicitates the aimed action(s)?

4.1.3.2 Undesired affordances

Another important aspect of the concept of affordances is not only to help create a design that possesses certain affordances – Mair and Fadel (2009) describes how it must also *not* possess certain *un*desired affordances. They (ibid) give an example of large hallways in a building block, aimed to enhance the contact and community between neighbours, but which instead afforded an unsafe passage that attracted muggers and other type of criminality. Another of their examples is World Trade Center, which were a powerful symbolic architectural landmark, but at the same time afforded a very effective target for terrorism (Mair and Fadel, 2009). A more general and common challenge can be seen in the layout of modern open plan offices. Here exists a contradiction between the aim to make people interact and exchange knowledge, and at the same time making people productive and focused on their task at hand. Here the affordance of interaction and talking can contradict the affordance of focus and concentration, if the architects do not pay attention.

Functional affordances: Undesired affordances
Relevant aspects for sketching architects

• Does the suggested design create possibilities for undesired behaviour or other unwanted side-effects?

4.1.3.3 Affordances as health promoting

If architects desire to design with an environmental psychology perspective, the health and well-being of the users, should be one of their top priorities. The article *'Using affordances as a health-promoting tool in a therapeutic garden'* emphasise that the concept of affordances plays a role in promoting health and well-being (Grahn, Ivarsson, Stigsdotter, and Bengtsson, 2010). Grahn et. Al. (2010) argues that an environment which offers utilities such as beauty, pleasure, and a rich experience of the senses, contributes to our level of happiness and satisfaction. Hence sketching architects should aim for the creation of a rich design which provides aesthetic, comfort, and variation, in order to afford positive health benefits among the user group(s) of their design.

In relation to our sensorial experiences of the world, it can be explained through different systems. Grahn et. al. (2010) describe how the pain and pleasure system are one of the most foundational ones, meaning that we instinctively seek places that afford pleasure, while we avoid places that afford pain. Therefore, a possibility to regulate ourselves in our surroundings is of great importance for our comfort and well-being (ibid).

Not just the physical senses and comfort, are vital for our experience, the perceived and used affordances of an environment are also affected by the

emotional state of the users. Grahn et al. (2010) explains how emotions are very important for our perception of affordances, for instance, an angry person can see a pillow as facilitating beating the hand in it, while a frightened person will rate the environment in how it affords safety or possibilities to flight. The researchers at SLU (Grahn et. Al 2010, Grahn, 2005; Ottosson and Grahn, 2008) has grouped all these types of instincts and emotions to a concept they call 'emotional tone'. They describe it as follows: *'The environment can signal a calm, positive warm, interesting, and secure atmosphere, or more complex, chilly, precarious or even insecure, threatening and distressing atmosphere'* (p. 142, Grahn etc. 2010).

Other researchers are also looking into affordances in relation to emotions. Kyttä (2003) emphasises the emotional value of affordances, which she refers to as 'affordances for emotionality'. She describes that those qualities can be found in places that provides experiences of beauty, restoration, or other emotions (Kyttä, 2003). For instance, Kyttä (2003) portrays how a fireplace provides practical qualities such as warmth and cooking possibilities when on an outdoor trek, but just as much it affords a restorative experience, which is more emotional, than functional. Kaplan and Kaplan (1989) likewise describe this emotional value of a fireplace, for instance how the flicker of the flames may help the viewer to forget about a stressful day. Grahn et. Al (2010) actually argues that natural elements in general, such as water, stones and trees, can provide communication with us, that helps regulate our emotions in a positive way.

To summarise, the environment can provide functional affordances, and related to those can also be added a perceived layer of positive emotional affordances, with the potential to facilitate restorative experiences.

Functional affordances: Affordances as health promoting
Relevant aspects for sketching architects

• Are sensorial experiences and variations part of the design?

• Does the design afford the possibility to regulate one's surroundings? For instance, the opportunity to open a window, or adjust the light within a setting.

• What is the 'emotional tone' of the space designed? Is it a positive ambiance, that affords the users to regulate their feelings, to minimise negative moods (such as fear, by providing a sense of security) and does it afford the users to gain positive feelings of interest and enjoyment?

• To afford restorative experiences and health benefits, is it possible to incorporate greenery or other natural elements in the design?

4.1.4 Cultural affordances

*'The adequacy of an activity does depend in part on agreement
with what the members of a sociocultural practice do'*
(Rietveld and Kiverstein, 2014 p. 332)

The first part discussed affordances as existing somewhere in between an individual and the surrounding physical environment, looking different for each person depending on the individuals perception, abilities, goals and intentions. However, a significant number of affordances are in fact common to larger groups of individuals, and perception of shared affordances is an essential part of socialisation (Gibson, 1979; Kyttä, 2003; Heft, 2007; Loveland, 1991). Alan Costall (2012, 2013) and Ann Richards (2013) argue that some of the confusion around Gibson's concept of affordances might be due to the fact that he does not distinguish between affordances in general, and what Costall classifies as 'canonincal affordances', meaning affordances that are conventional and normative. As a matter of fact, most objects in our surroundings are designed for a specific purpose, and in line with this Costall and Ann Richards (2013) state that artefacts already embody human intentions. They (ibid) argue that we need to recognise the special status of 'canonical affordances' as the established, widely agreed use-meaning of things in our environment. This is also addressed by Sylvest (2016), who describes that the use-meanings make us introduced to a certain way of using objects in a given context, and through that we learn not only what an object 'happens to afford', but also what it is 'meant to afford'. Costall and Richards (2013) give a concrete example with chairs, describing how chairs are in some way impersonal (one sits on chairs), meaning that they are made for the purpose of sitting, even though one can also use them to stand on when changing a light bulb. Hence, in practice a chair affords limitless uses and meanings, but in our culture and society the purpose of the object, and the use of the artefact is highly regulated (which is also, to great amuse, the subject of the Swedish children book *'Nasse hittar en stol'*).

Figure 7. Example: What a chair affords is in theory endless possibilities, however in practice the our perception and regular use of it is very much defined by our culture and norms.

Not only does object around us have predisposed use-meanings, but they are also part of a larger society, with standardised practices. Rietveld and Kiverstein (2014) highlight the idea that use-meanings and intentions of objects are part of a larger social context. They describe the way animals live, which normally consists of patterns of behaviour, meaning relatively stable and repetitive ways of doing things, common for most individuals in that part of the ecological niche (Rietveld and Kiverstein, 2014). Among humans these types of regular patterns exist as well, only that instead of being founded basically on biological aspects, they are to a large degree embedded in our sociocultural practices and normative behaviours, all part of the larger communities we belong to (Rietveld and Kiverstein, 2014). They describe it as follows:

> Exercising an ability can be better or worse, adequate or inadequate, correct or incorrect in the concept of a particular situation, hence there is a normative dimension to the abilities for picking up affordances
>
> (Rietveld and Kiverstein, 2014 p. 326)

Heft (2007) further supports this view when he argues that since the environments, we live in have almost always been transformed by human activity, perception-action processes are most often linked to a social and cultural aspect. Loveland (1991) have a distinction of this culturally influenced affordances, which she refers to as 'preferred affordances' and describes as follows:

> Preferred affordances are selected from among the very rich set of possible affordances available to the perceiver. /…/ Preferred affordances are culturally selected /…/ That is, they reflect participation with other people in a shared cultural milieu that predisposes the individual to use objects, interpret events, and so on, in particular ways.
>
> (Loveland, 1991, p. 100)

The way objects around us are incorporated in standard practices in society, are deeply rooted, and as such naturally passed on to new generations. Younger children gradually learn to perceive things around them as made for certain purposes (Costall and Richards, 2013), and the way they learn to develop skills related to affordances in their environments starts already when their caregivers teach them what to notice in the environment and what to do with the things they see (Rietveld and Kiverstein, 2014). Kyttä (2003) describes this process of how the perception of affordances is taught to children, through language, pictures, toys, as well as through the observation of activities of other children.

However, this contextual influence on our perception and use of affordances, also have a bit of an undesirable side. Rietveld and Kiverstein (2014) describe that because of the way we learn to notice and make use of certain affordances within a context, we also have a tendency to get stuck in those patterns and our ability to come up with new skills therefore diminishes. Since we are into the normative behaviour of our social context, it is difficult to explore new affordances, as well as to pick up from unconventional ones, and we easily get caught in a 'this is how

we always do' mindset (Rietveld and Kiverstein, 2014). Hence, if we manage to get out of this box, there is a possibility that one can discover new affordances offered by already familiar aspects of the environment. The relevance for architects is clear, Rietveld and Kiverstein (2014) states that:

> ...having a better conceptual understanding of the relational nature of affordances is important for creative professions because it suggest new ways of increasing our openness to these available resources
>
> (Rietveld and Kiverstein, 2014 p. 339)

This idea, which put creativity in perspective, is already mentioned by Loveland (1991) who writes: *'Part of what we call creativity seems to involve the ability to transcend the preferred set of affordances when considering the affordances of objects and events'* (p. 100).
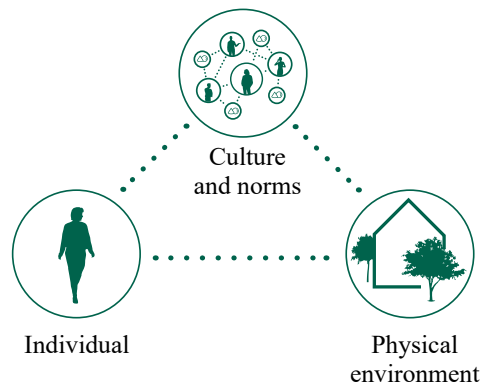

Culture and norms

Individual

Physical environment

Figure 8. Cultural Affordances adds the parameter of culture and norms onto the relationship between an individual and the physical environment.

Cultural affordances
Relevant aspects for sketching architects

For architects, the concept of cultural affordances is relevant in various aspects. First it gives a chance to foresee and regulate how people act in a certain setting by adding normative design cues (for instance seating where people are supposed to sit down). However, an even more interesting aspect for architects is how to challenge the mindset, and create non-deterministic design, making the users of the architecture more open to potential affordances around them.

• Are there areas within our current design project where we want to use cultural norms to support a certain behaviour or acting?

• Can we as designers create an openness to discover new affordances, and challenge the 'this is how we always do' mindset?

4.1.4.1 Perceived meaning and symbolism

A further relevant aspect of the cultural affordances is that of meaning and symbolism. Forms and design choices does not necessarily have a meaning themselves, but they can transmit meaning through images enriched by associations (Pallasmaa, 1986). Maier and Fadel (2009) describes how meaning may be associated with symbolism from historical, cultural or social aspects. For instance, columns in the façade of a building, afford basically a load bearing structure, supporting the weight of the roof. However, the associations and perception of the columns goes way deeper: *'... to some they mean power and prestige hearkening back to the Grecian and Roman empires /.../ to other people these columns may symbolize American colonial racial repression'* (Maier and Fadel, 2009, p. 403). Another example from Maier and Fadel (2009) is marble on the floor of a bathroom, that whilst having a function of being a surface to walk on and a water-proof seal, at the same time likely will be perceived as something luxurious because of its expense and cultural associations. Thus, associations can afford meaning to us, and different types of symbolism can afford certain aspects of cultural identity.

Grahn et. Al (2010) also describes the value of symbolism, as part of the rehabilitation program in the therapeutic garden of Alnarp. Here the activity of finding symbols in nature were considered powerful in affording support to the participants healing processes. Grahn et al describe: *'Sowing a seed and caring for the shoot by watering, applying manure and weeding can cause the participants to consider caring for themselves – to realize that they are worth caring for.'* (p. 134)

Cultural affordances: Perceived meaning and symbolism
Relevant aspects for sketching architects

Symbolism and associations are closely tied to what an architectural building conveys, encompassing its identity and values. This makes it an important topic for architects to reflect upon.

• What message should the building communicate?

• Are we sure that our project does not unintentionally convey negative symbolism or associations?

• Could adding symbolic activities enrich the project?

4.1.5 Social and communicative affordances

> *'The principal affordance of face-to-face encounters is the
> possibility to share action'*
> (Jensen and Pedersen, 2016, p. 81).

The third defined category direct attention to affordances occurring between persons, meaning the possibilities for interaction that other people afford us. This aspect is often referred to as social or communicative affordances (Loveland, 1991; Kyttä, 2003; Sylvest 2016). Gaver (1996) summarises it as follows: *'Research on 'social affordances' /.../ focuses on the possibilities for action that people offer one another and on the role of other people in pointing out new affordances (e.g., to babies).'* (p. 3) Concretely this is a rich part of our lives and experience of our everyday, and Loveland (1991) describes how the social affordances can be expressed in example through conversations, writing, gestures, facial expression, body postures and movements, as well as tone of voice.

Gibson was touching this aspect of affordances, even though he did not categorise them by the name social affordances. He described how other people provides us with a rich and complex interactive network, and that those contacts are reciprocal, for instance a mother and child's attachment to each other, which can provide nurturing, playful, cooperative and communicative affordances (Gibson, 1977; Kyttä 2003). Social affordances make it possible for individuals to understand and engage in not only what the environment affords themselves, but also in what it affords other individuals, and further regulate their behaviour based on understanding of this (Loveland, 1991). Loveland (1991) gives an example of a person being able to tell an individual what happened in a room when that person was gone, because the individual understands that the person who had left the room missed out on something. Moreover, this type of social affordances helps predict the behaviour of others around us, for instance who is friendly and who is threatening, and is by this vital to make an individual function well in a human society (Loveland, 1991).

The concept of social affordances has further been linked to affect and emotion in relation to social interaction. Jensen and Pedersen (2016) investigate how affordances work in relation to emotions in social interactions, as a mean to analyse and understand the on-going choices that underlies human interaction. The idea is that the minute we start engaging with other people in a shared space, we need to make constant choices on how to respond to the current behaviour around us. Jensen and Pedersen (2016) describe it as: *'The theory of affordances offers an interesting perspective on how the environment guides and scaffolds action and perception in species-specific ways. Affordances are often explained as action possibilities'* (p.80).

Jensen and Pedersen (2016) studies how emotions emerge in the encounters between people and how the individual's affective engagement within the situation

invite responsive situational behaviour. This is also a topic by Kiverstein and Rietveld (2012) who describes it as follows:

> 'A friend's sad face invites comforting behaviour, a colleague at a coffee machine affords a conversation, and the extended hand of a visitor solicits a handshake. Affect plays a crucial role in preparing us to act in these cases: it signals which possibilities for action in a situation matter to us in sense of being relevant to us given our interests and needs.' (p. 1)

Jensen and Pedersen (2016) investigate how those types of social affordances work in real life settings (for instance at an emergency ward and in a kindergarten), which they refer to as 'organisational eco-systems', meaning that there exist a set of expectations of how specific actions can be carried out by the participants to achieve pre-defined goals. Through their research Jensen and Pedersen (2016) have made an interesting finding, that affordances are not just species-specific, they are also profession specific. This aspect is very well illustrated in a study of an emergency ward, where the patient appears scared and insecure, and perceives the emergency doctor as an affordance for dialogue and an emotional alliance (the patient seeks a soothing or calming reassuring explanation from the doctor). The doctor on the other hand is alert on the screen located above the patient's head, dealing with the medical problems, which engages her in abstract cognitive activity and making her unable to perceive the same affordances as the patient, and hence the doctor does not meet and react to the reaching out from the patient (Jensen and Pedersen, 2016). So, to summarise; social and communicative affordances are vital for our incorporation with other individuals in our societies. These types of affordances are largely affected by emotions and effects, and as it turns out even by our profession.

Figure 9. Example: Children can perceive a caretaker as affording comfort and safety. A patient can perceive a doctor as affording reassurance.
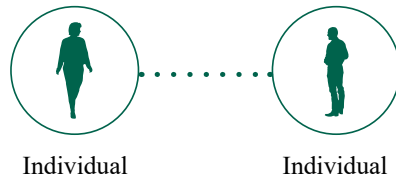
Individual   Individual

Figure 10. Social Affordances regards the possibilities for interaction that other people afford us.

Social and communicative affordances
Relevant aspects for sketching architects

Understanding the potential affordances between individuals can offer architects a broader comprehension of their user groups and the dynamics between them. For some projects (for instance health care or education), it might be valuable to look at the users as 'organisational eco-systems'.

• Who are the different types of users and professions expected to interact within the settings we are designing? (e.g., doctors and patients, teachers and students)

• How can the interactions defined be supported by the design? (e.g. single person hospital room can make it easier for the doctor and the patient to talk confidentially together without other patients overhearing)

4.1.6 Affordances for sociality

'Using the concept of affordances to describe material properties of the environment that affect how people interact'
(Gaver, 1996, p. 111)

The last defined category of affordances addressed in this Master's thesis combine the previous ones and concentrate on how the shared physical environment affords social interaction between persons. Sylvest (2016) argues that this aspect of affordances is extremely relevant for the designing and evaluation of our physical surroundings.

One researcher who has focused on this part (although with an emphasise on human – computer interactions, rather than human - architecture relations) is William W. Gaver. He uses an ecological approach to social interaction, where the concept of affordances is being used as a tool to describe environmental shaping of social actions (Gaver, 1996). Gaver (1996) criticises the traditional psychologists for having a tendency to designate too much of our perception in terms of cognitive structures (such as memory and problem-solving), while at the same time forgetting the effect of all the physical energies that surround us. He highlights that social behaviour should be understood as to a large part embedded

and shaped by its material context, in which physical properties can be described in terms of affordances for interaction between people (ibid). He refers to this approach of the concept as 'affordances for sociality' (Gaver, 1996). The relevance for architects and designers is clear, as Gaver (1996) states: *'the more we can understand social behavior in terms of its material context, the better can design efforts be focused on relevant attributes'* (p. 111). He exemplifies it as for instance the way tables are laid out in restaurants, where small and well-spaced tables will afford an intimate encounter, while tables arranged in long rows affords a social celebration (Gaver, 1996).

Figure 11. Example: How social events unfold is largely affected by the physical environment in which they take part. This is very evident for example in restaurants, where the atmosphere, type of furnishing and level of formality will all influence the experience and what type of behaviour the guests feel is appropriate.
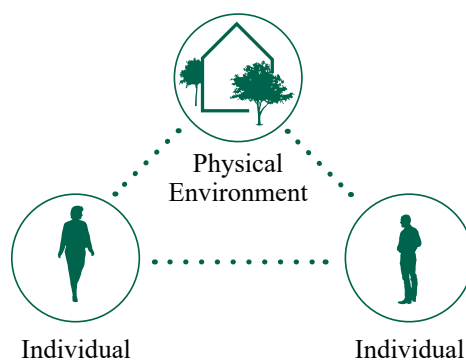

Figure 12. Affordances for sociality - how the shared physical environment affords social interaction between agents.

Affordances for sociality
Relevant aspects for sketching architects

As an architect it is relevant to consider how the design can afford various social interactions among the building's users.

• Which type of social interactions do we wish for in the current project? (for instance play between children or spontaneous meetings between neighbours in a residential building)

• How can we work with design elements and atmospheric settings to afford the desired interactions?

4.1.6.1 Behaviour settings

A psychological concept highly related to affordances of sociality is that of 'behaviour settings'. Deriving from studies of behaviour in situ, investigating the relation between different physical spaces and the connection to social codes and patterns of behaviour (Barker, 1968; Heft 2014, Sylvest 2016; Kyttä, 2003). The concept highlights how a specific environment forms a physical and social system, that shapes the actions of agents according to norms, rules and practices, and hence become a collective concept related to a particular physical context (Kyttä, 2003). Kyttä (2003) summarises: *'Behavior settings are thus a group of those affordances that a group of agents shares in a certain place at a certain time'* (p. 51).

Behaviour settings consequently combine physical and social elements of the environment into a milieu, which have strong influences on human behaviour (Sylvest, 2016). Sylvest (2016) likewise argues that behaviour settings offer a situated type of affordances, where the perception and action of affordances are highly related to the specific environmental setting, she describes the importance of behaviour settings as follows:

> '… Barker and his colleagues found that a person's behavior changes dramatically between different places, and that the collective behaviors of the people present in a specific place are often more similar than the behavior of a single person across different places' (p. 52).

Researcher Harry Heft (2014) have a similar statement: *'...the most revealing predictor of an individual's actions at a particular time is knowing **where** that individual is.' (p. 391).*

The fact that affordances are situated, related to the place where the event takes place are a red thread through the work of Heft's research (2001, 2003, 2007, 2014). He describes the relevance of including Baker's behaviour settings when investigating sociocultural practices among people. Heft (2001, 2003, 2007, 2014) moreover studies the nature of behaviour settings, for instance the way they influence people, are part of their everyday life, and how individuals (without

reflection about it) maintain the behaviour setting by participating in it. He (ibid) describes how we in our lives pass through a series of behaviour settings and adapts to the socially normative practices of each particular setting. Further on, since people know what a specific place has to offer, they have the possibility to consciously seek out predicted affordances through places, which can be seen in our relationship to places such as homes, playgrounds and restaurants (Heft, 2007).

The role of other people for affordances to unfold, are due to Heft, extremely significant, he describes a very illustrative example:

> 'Behavior settings make certain psychological occurrences and experiences possible beyond the affordances of individual milieu features. For example, a basketball, owing to its properties, affords dribbling for an individual; but a sufficient number of willing and adequately informed persons in a gymnasium equipped with a basketball and hoops affords a game of basketball for that individual. In short, the affordances of a place for an individual derive from the dynamic, joint interrelationships among the participants and milieu.'
>
> (Heft, 2007, p. 98)

Hence, looking at affordances for sociality and behavioural settings, strongly indicates that in order to fully integrate the concept of affordances in a design process, the way the environment and places are designed in relation to social interaction between people, must be of great consideration.

Affordances for sociality: Behaviour settings
Relevant aspects for sketching architects

It is relevant for architects to view their design through a holistic lens, where an understanding of the whole context around the users, as the creation of milieus where sociocultural practices takes place, is in focus.

• What is the behaviour setting we are designing for? What are the shared practices the users will engage in?

• Which types of affordances are so associated with the typology of building we are creating, that users will consciously seek out the place to practice them?
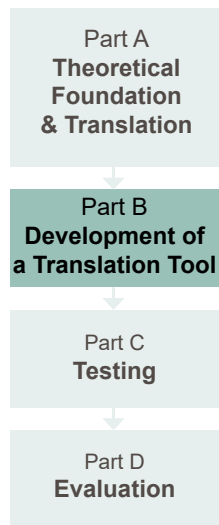
4.2 Part B. Development of a translation tool

Figure 13. *The second part of the result chapter describes the structure, layout and content of the tool draft.*

4.2.1 The translation tool draft

As described in the method chapter the structure of the translation tool naturally unfolded into three steps; beginning with a user definition, followed by worksheets addressing various aspects from the concept of affordance, and finally an implementation canvas for recording the summary of the findings. This chapter will provide a description of how each of these steps turned out in the final tool draft.

4.2.1.1 Introduction pages and manual

To introduce the architects and give an overview of what is coming, the tool begins by illustrating the three steps participants will follow as they interact with it.
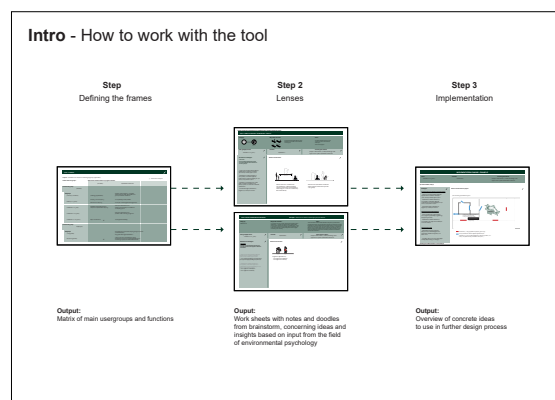

Figure 14. *The tool begins with a page introducing its structure and outlining the three steps that the architects will progress through while engaging with it.*

4.2.1.2 Step 1. User group matrix

The method chapter introduced a user group matrix as the intial step of the translation tool, to make the architects reflect about their core users and their needs in relation to the functional program of the building in focus. For the concept of affordances to make most sense, it was considered an advantage to break down the core user groups into finer, more defined subgroups. As a result, the matrix therefore consist of a grid with rows for defining various core user group categories (for instance '*families*') and hereafter the possibility to specify these into subgroups (for instance '*babies 0-1 years*' and '*toddlers 2-3 years*').

To reflect further on the user groups, columns were added alongside the rows of categorisation. This arrangement allows the architects to consider the unique needs of each subgroup in relation to various programs of the project. For instance, if we take the subgroup of '*babies 0-1 years*' at a museum, the functional areas might be '*exhibition hall*' and '*support facilities*'. In this matrix, the architects can then articulate various requirements. In the example of *'babies 0-1 years'*, suggestions for the exhibition space might be about stroller-friendly areas and zones that affords touching and crawling upon. Meanwhile, the necessary support facilities may encompass aspects such as a nursing room, a diaper-changing station, and access to a microwave.

By breaking it down this way, the idea was to provide the architects with an overview of user group needs in relation to the building program. The matrix is thought to be filled out by the architects while discussing what they know (or imagine) about the users. In a perfect scenario, to get around all the subgroups would be optimal, but for the sake of time and mental capacity, it might be more realistic that the architects only map out their core target groups and their needs.
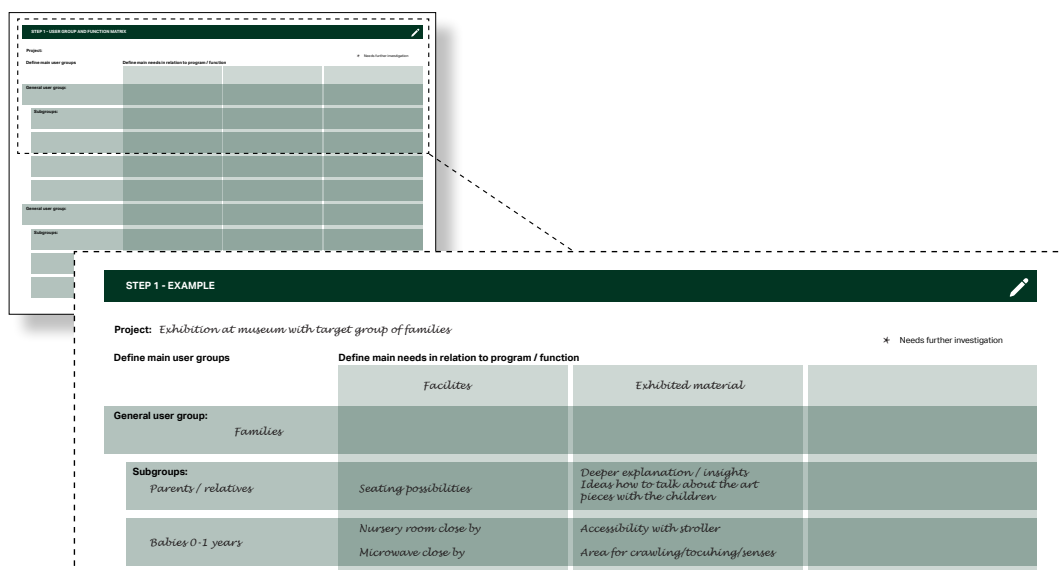

Figure 15. *Illustration of the layout of the user group matrix, and an example of how it can be filled out.*

4.2.1.3 Step 2. Lens sheets

The lens sheets play a crucial role as they represent the step where the architects actively engage with knowledge from the field of environmental psychology. It was considered beneficial to create worksheets that could build upon the user group matrix. This was accomplished through a structured format where each lens sheet focused on one of the defined subgroups and a functional area at a time. The lens, representing a specific aspect of affordances, was then introduced to illuminate the unique needs of the selected user group within that particular focus (for instance *'babies 0-1 years'* in an *'exhibition space'* seen through the optic lens of *'functional affordances'*). In this way, the idea was that the same lens sheet could be used to gain insights into how the design can cater to various user subgroups across different functional areas. Or it could be reversed, with a fixed subgroup and functional area being the focus point and exploring them through a variation of affordance perspectives.

As described in the method chapter, the layout of the lens sheet was informed by the insights gathered in the background chapter (see the summary box on p. 14). The layout includes inspirational questions for the architects to brainstorm and design around, makes use of illustrations and examples, and has room for the architects to note and sketch down findings directly on the tool sheet. See the final layout of the lens sheets in the tool draft below.
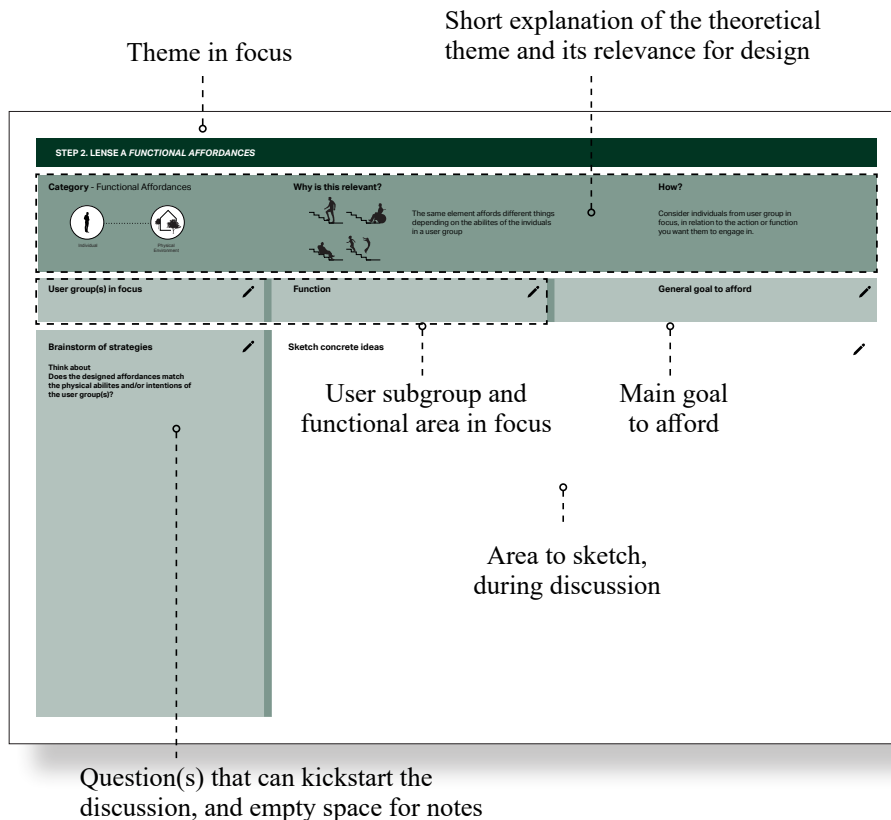

Figure 16. Overview of the structure and content of a lens sheet.

For the translation tool, a draft of twelve sheets was created, with each their angle of affordances. The full list of sheets is presented below.

Overview of the lens sheets created for Step 2 of the Tool draft

Lense A.1 Functional affordances
What the physical environment affords to an individual

Lense B.1 Adaptability
Possibility to create new affordances, and hence customise the experience and use of a space

Lense B.2 Solicitations
Possibility to encourage desired behaviour

Lense C.1 Restoration - Natural elements
Focus on incorporating natural elements to afford well-being

Lense C.2 Restoration - Emotional tone
Affordances supporting the users to regulate their feelings

Lense C.3 Restoration - Sensorial experiences
Affordances for a rich stimuli of the senses

Lense C.4 Restoration - Self regulation
Possibility to regulate one's surroundings

Lense D.1 Openess to affordances
Make the design less determined and pre-defined

Lense D.2 Meaning and symbolism
How design communicate through associations and identity

Lense E.1 Social affordances
Analysing user interaction and the goals and intentions of this

Lense F.1 Affordances for sociality
How the shared physical environment affects how people interact with each other

Lense G.1 Undesired affordances
Consider if the design can support undesired behaviours or other side effects

4.2.1.4 Step 3. Implementation canvas

In the last tool step blank sheets, inspired by the layout of the lens sheets, were created. The intention was to provide the architects with a platform for combining their insights and ideas through notes and sketches, thereby facilitating an organised overview of key aspects for them to consider when moving forward with the project. The full layout of the implementation canvas, and a filled-out example sheet, can be found in the Appendix named *Translation tool draft.*
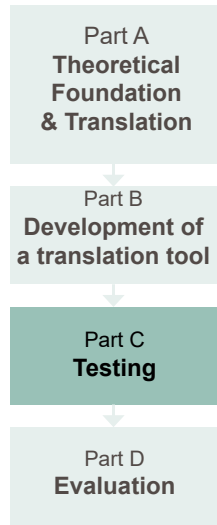
4.3 Part C. Testing the Tool

Figure 17. The third part of the result chapter describes the outcome and findings from the Pilot Study

4.3.1 General procedure of the pilot study

The Pilot Study unfolded in a manner different from what was initially expected. Originally the idea of the set-up was for for me to take on a more observant role on the sideline, allowing the architectural group to independently navigate through the tool sheets. However, they demonstrated much less focus on the printed work sheets than anticipated, and it became apparent that they looked to me for guidance through the tool. Although this was an unexpected turn, seen in retrospective it resonates with findings from the literature review. As described in the background chapter, Kirkeby (2010; 2012) explain that architects generally prefer for an expert to come out to their practice and support them in integrating aspects from their field into their project. In the Pilot Study, it became evident that the architects viewed me as that expert. Consequently, I transitioned into the role of a workshop facilitator, leading the team through the various steps of the tool.

While the architects did not utilise the translation tool as independently as anticipated, the interaction between them and the tool's content proved highly effective. The architects naturally started to brainstorm around every topic that was brought up. Their level of engagement and enthusiasm was readable within the space, and each subject naturally created a discussion within the group. The discussion to a large degree became centred around suggested design solutions for the area in focus. This observation aligns with insights from the literature review, as highlighted by Kirkeby (2012), where architects are shown to prefer acquiring new knowledge through participatory dialogues focused on specific problems within a given project, rather than seeking answers in research articles or reports. Similarly, Lawson (2005), describes how designers use knowledge as a mean to find solutions, and hence emphasising direct influence on the design.

While the initial purpose of the tool was for the architects to sketch and annotate directly onto the printed worksheets, I naturally found myself taking on the role of documenting their insights. This shift occurred since the architects became absorbed into the discussions. Initially, I attempted to intervene and encourage them to record their findings, but with a multitude of design ideas being tossed around, translating those concepts into the organised structure of the tool sheets proved challenging. It became evident that the act of documenting was cumbersome and, more importantly, disrupted the flow of their lively discussions.

In my role as a workshop facilitator, I maintained a neutral perspective in terms of opinions, however, I started to employ follow-up questions to prompt participants to delve deeper into their conclusions. For example, when the group of architects arrived at the decision to incorporate *'exclusive materials'*, I probed further by asking them to identify what they considered to be exclusive materials for the specific user group currently under consideration. In this way, it felt as though I was engaging the design team in a dialogue that unfolded their perspectives on specific environmental psychology-related topics.

4.3.2 - Result from Step 1

The first step focused on defining the core user groups and identifying their overarching needs in relation to functional programs within the building. During this stage, the architects needed a bit of guidance to become as specific as the tool intended. Their intuitive answer when asked *'who are going to use the reception area?'* were *'people checking-in or wanting some sort of service'*. However, as soon as they had grasped what the idea with the exercise was, their brainstorm began, and a lot of potential user groups came up. Groups they defined were for instance:*'group of colleagues arriving for a conference'*, *'elderly couple on holiday'*, *'family with three young children'* and *'couple on romantic getaway'*. After mapping the users, the architects were asked to target different needs or functions such as for instance *'where will the children wait when one of the parents are doing the check-in?'*.

4.3.3 - Result from Step 2

The second step involved exploring various aspects of affordances by using the lens sheets. Overall, the architects exhibited a high level of proficiency in understanding the diverse themes and engaging in brainstorming sessions to explore how these lenses could shape their design. Notably, it seemed like the more specific the theme, the easier it was for them to be creative. For instance, framing a question like *'How can you utilise symbolism and meaning to enhance the luxury experience for an elderly couple checking in at the reception desk?'* naturally inspired concrete design ideas, such as *'we should incorporate symmetry and use exclusive stone materials.'* The consideration of affordances for sociality, with the same user group and area in focus, prompted discussions on topics like light sources (such as highlighting the face of the receptionist) and ensuring acoustic privacy.

Around midway through the workshop, the conversations ended up jumping between the lenses and user groups, with ideas from one theme sparking new insights for another. It became evident that architectural discussions are inherently dynamic, and as such less structured than the tool was designed for. In this context, my role evolved into maintaining the architects' focus during discussions, gently guiding them back to the themes and user groups under consideration at the moment. Simultaneously, I took notes to capture their ideas, ensuring not to disrupt the flow of their engagement in the ongoing discussion.

4.3.4 - Result from Step 3

In the third step, the design team was tasked with consolidating their insights and ideas onto the implementation canvas. However, this phase evolved into a more informal agreement within the design team on the strategic direction for the subsequent design process of the reception area. The architects asked me to write down their conclusions and send those to them via email. They also asked me to include the responsible partner for the project, who wasn't part of the workshop, seemingly to ensure visibility of decisions and outcomes at a higher level within the project organisation.

Interestingly, the architects did not inquire about retaining the tool sheets with my notes. This further underscores their emphasis on the discussions and findings derived from the tool, rather than the actual tool itself. Also it aligns with the findings from the literature review, highlighting that architects prioritise tangible outcomes directly applicable to their specific project at hand, as described by Lawson (2005) and Sylvest (2016).

The email containing the outcomes of the workshop is shown on the next page.

WS Focus: Reception desk and surrounding area

<u>Reception desk:</u>
- **Sightline** to reception desk directly from entrance(s)
- **See a person** working at the reception desk as first thing, and not just empty desk (hence the desk should not be too high)
- Reception needs close proximity to drop off
- Easy to understand **which path(s) to walk** towards reception (fi. texturized pathways)
- Paths and main flows should be **well-lit**
- Reception desk should be architecturally read as **one large sculptural object**, 'an exclusive shaped art element'
- Work with visual **symmetry** around reception area (reference to traditional luxury)
- Possibility to **sit down** at reception desk, while getting information etc. (perhaps bar stools?)
- **Subdivisions** – make it possible with 1:1 encounters around element, exclusive feel + privacy
- Should address two aspects:
  - a) **central information point** – supporting everyone to orient around
  - b) possibility for **acoustic privacy and discrecy** for VIP clients arriving (can be made with different depth, curves, or niches)
- **Well-lit face of the receptionist** – supports reading face expression and lip movement (hence background light must be complemented with light from front)
- The whole entrance area from drop-of can by material and textures **stand out from rest**, with a contemporary 'red-carpet-feel'
- **Natural** stone **material**
- **Highlighted** reception desk with light, reflective material above or similar, should be instantly visible when entering
- **Curved forms** (talking with back wall) or **straight lines** (contrasting back wall) can both be considered/tested
- **Acoustics** are in general very important to consider in this area

<u>Waiting possibilities close by reception desk:</u>
- Get rid of luggage first thing when you arrive
- People not doing check-in/waiting for someone should be able to get a **coffee, drink or snack** (**activate 'brasseri backside'** for this?
- Create a sense of curiosity by sneak peaks of what is going on inside the complex: **attract the eyes up** towards offerings on 1st floor (can be through vertical lines, stand out materials in ceiling or at void edges, light)
- **Use the back wall actively** – exhibiting, niches etc.
- **Variety in furnishing** – both soft and more stiff/formal
- To make the ceiling height seem higher, we could work with **partitions / curtains** creating zones on GF

<u>Emotion/feel:</u>
- **Gallery exhibition space** – everyone is welcome, but the space is exclusive with elements to walk around and admire

<u>Things to be cautious to avoid:</u>
- Airport check-in feel (meaning: careful when working with subdivisions)
- Not create a messy, complex design
- For the presentation tomorrow: not to confuse our client with too much preciseness of materials, colours etc.

Figure 18. The outcome of the pilot study - a list of design guidelines and areas of focus, that the architects came up with and agreed upon during the workshop.
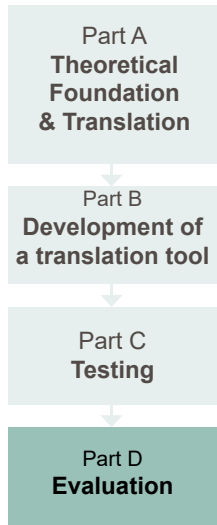
4.4 Part D. Evaluation of the tool draft

Figure 19. The last part of the result chapter describes the outcome and findings from the evaluation of the translation tool.

As outlined in the methodology chapter, the evaluation of the translation tool centred on three primary objectives. Firstly, gaining insights into how the participating architects perceived the translation tool as a working method, and the engagement with environmental psychology as a subject. Secondly, assessing the participating architects' perception of the extent to which the translation tool influenced the subsequent development of the area in focus. Thirdly, examining the reliability of the tool's outcomes in relation to the theoretical aspects originated from the field of environmental psychology.

To evaluate the topics above four methods were used (described in the method chapter), the results from each one of them will now be presented.

4.4.1 Observations during the pilot study

This aspect has been previously addressed in this chapter (see *4.3.1 General Procedure of the Pilot Study*). In summary, a key observational discovery was the challenge faced by the group of architects in independently engaging with the diverse tool worksheets, contrary to the original intent. The tool's layout and format appeared less intuitive and accessible than anticipated. Consequently, there arose a necessity for a shift in my role within the workshop, transitioning from an observer to an active facilitator. While the tool's content resonated and appealed to the architects, it proved more accessible when presented verbally by me rather than in a written format on tool sheets.

Further reflections on these findings are expounded upon in the discussion chapter.

4.4.2 Comments from the participants right after the workshop

One of the most interesting parts of this pilot study was to understand how the architects experienced working and interacting with environmental psychology in their project, and how they perceived the translation tool as a working method.

Despite the translation tool being a central element in this Master's thesis, most of the comments from the participants centered around their workshop experience and their view of environmental psychology as a field of input for their thought processes. Once again, this suggests that, for them, the translation tool itself played a secondary role in shaping their overall experience.

The spontaneous comments gathered at the end of the pilot study were predominantly positive. The architects expressed that they had really enjoyed the workshop as a break from their daily work routines. They commented that they particularly valued the specific design discussions facilitated in this type of format. One participant commented that it reminded of architecture school, where there was more time for deeper theoretical design discussions, and less high paced focus on pure production. Further they explained that they are under pressure with input from all sorts of fields such as building regulations, structural engineers, fire safety and various sustainable certifications - but that they enjoyed environmental psychology as it was a bit *'less strict'* and idea generating around it was not only easily relatable but also characterised as enjoyable and *'fun.'*

However, pinpointing whether the positive comments stemmed from the input of environmental psychology or from the opportunity for the architects to engage in a facilitated design discussion remains a challenge in this study. Notably, the positive feedback emphasised the workshop as a *'safe forum'*, creating an environment where there was room for all participant's opinions and ideas to be heard and discussed. One specific comment encapsulated this:

> 'I really felt part of a team. Often we divide tasks, and then work more individually. It is rare that we take time to sit down and discuss design in this way. I really enjoyed the brainstorming part and the discussion with my team, away from computer screens, and before dividing tasks you have a common and clear vision.'

This observation aligns closely with the research findings from the literature review, emphasising the architects' production-focused workdays where the tangible output of drawings is in focus (Kirkeby 2012; Sylvest 2016). Another comment was: *'I think we should do that for every project... I find that in an office situation it's so fast paced we dive right into the plans and deliverables that we don't think about some of the questions you asked.'*

Regarding their perspective on environmental psychology, the architects responded that the aspects being discussed resonated with them. They expressed

that they could follow and understand the importance of the various theories for the user experience, and that there were many aspects they believed could help guide the concrete design. Furthermore, participants communicated an increased confidence in approaching the design of the reception area in focus of the workshop, as the strategy laid for it had been based on some research and agreements within the team.

4.4.3 Comments from the participants a couple of days later

In terms of how the workshop had influenced the design, the participants were asked individually a few days after the workshop. All of them expressed that it felt safe to continue to work on the design, as the decisions now had been made common decisions within the design group, and not individual ones. They highlighted that because the basis of the discussion was founded on applied research, they felt that it was afterwards easier for them to argue about why they had decided to design like they did. This is in line with what Sylvest (2016) describes; that there is an increasing demand on architects to present argumentations for how their design perform from a user perspective, and environmental psychology can help providing those. The architect who became responsible of the actual design drawing of the reception desk expressed it as follow:

> 'I tried to incorporate these ideas in my design after the workshop. And I felt more confident about my design, because it seemed like it responds well to all the expectations discussed, and also I believe that if this workshop had happened earlier, it would save me a lot of sketching time, because I would know better what I am looking for. So, I think it is very important to have these workshop meetings at the beginning of the project. It brings the whole team together, it shapes a clear idea, and sets a common goal.'

Hence, the fact that environmental psychology can provide the architects with a clear path, and possibly stronger arguments for the way they design, might enhance their motivation to integrate this knowledge into their design processes.

Notably, a couple of months after the workshop, the participant architects have spontaneously expressed their positive sentiments about the experience. Also, I have been approached to conduct similar workshops within the studio, this time for various design teams.

4.4.4 Evaluating the reliability of the outcome of the tool

For a bridge to be created between research and design practice, it is crucial that the findings made from the work with the translation tool align with its theoretical foundation. Meaning that the tool, when applied, should generate reliable results. However, measuring this aspect proves to be challenging. Affordances, by its very nature, is a broad concept that allows for numerous interpretations, even

sparking debates among environmental psychologists (Costall 2012, Rietveld and Kiversten, 2014, Sylvest, 2016). Consequently, there is no objectively measurable standard for right or wrong outcomes. Nevertheless, it makes sense to examine the results of Step 3 of the translation tool and reflect on whether the design suggestions that emerged here align with the theoretical foundation, or not.

The outcome was presented in Figure 18 on p. 53 in this chapter. Examining this list, it seems like the findings in general does make sense considering what a reception desk area should afford to support a pleasant user experience, for instance:

- See a person working at the reception desk as the first thing when entering, and not just an empty desk (hence the desk should not be too high – so that a person behind can be seen even if they sit down)
- Well-lit face of the receptionist – supports reading face expression and lip movement (hence background light must be complemented with light from front)
- Should be easy to understand which path(s) to walk towards reception (fi. by texturised and well-lit pathways)

Looking at those type of findings, they seem to create guidelines based on an understanding of the user experience of the reception area. Indicating that the working method and focus of the pilot study has supported the architectural team to create tangible design recommendations with specific users in mind. Further on, what is very interesting to note is that the architects incorporated the concept of affordances alongside their own design interpretations, and hence added their spatial understanding and aesthetical touch to it. Some notable examples of this are:

- Reception desk should be architecturally read as one large sculptural object, 'an exclusive shaped art element'
- To make the ceiling height seem higher, we could work with partitions / curtains creating zones
- Work with visual symmetry around reception area (reference to traditional luxury)
- Highlight the reception desk with light, reflective material above or similar
- Gallery exhibition space feel – everyone is welcome, but the space is exclusive with elements to walk around and admire

The validity of the findings from the architects, in relation to the theoretical field of affordances, seems to be sensible. While it is acknowledged that the concept of affordances could potentially produce various outcomes, the suggestions put forth by the architects do not seem incorrect. The architectural team have demonstrated a thoughtful reflection, considered various types of affordances and successfully translated these insights into tangible design guidelines.

Further reflections on the validity are presented in the discussion chapter on p. 66.

5. Discussion

The overall aim with this Master's thesis has been to investigate how to create a bridge between research from the field of environmental psychology and architectural design practice. In this concluding part of the thesis, the goal is to discuss how well the translation tool worked as a mean to create this bridge. Additionally, the discussion will examine the insights and understanding gained throughout the process, regarding the implementation of research into architectural practice.

5.1 Method reflection

Having a research question highly related to incorporation of scientific knowledge into architectural practices, it seemed vital with a research design that focused on developing and testing a working method in real-life practice. That being said, the scope of the Master's thesis was a bit narrow in order to reach the full effect of this research method.

A potential weakness in the method arises from the inherent ambiguity in translating theory into the language of a tool, particularly in the conversion step, as further detailed in the upcoming section (*5.4 From Translation to Tool*). The precision of this conversion process can be challenging. While the idea of collaborating with professionals (from the field of environmental psychology) to discuss the theoretical validity of the translation was considered, it was not feasible within the scope of this project. In a broader context, if the tool were to be employed more widely, collaborating with experts to validate the translation and interpretation of theory onto the tool worksheets would be needed. Despite this limitation, it is essential to note that this Master's thesis primarily focuses on testing a working method, with the actual theory itself serving as a backdrop rather than the primary focus.

A limitation of the conclusions drawn in this thesis stems from the fact that the pilot study was conducted only once. Making it challenging to determine whether the observed outcomes were a result of this specific set-up, influenced by factors such as group dynamics within the team, or if they are indicative of the working method itself. To gain a more comprehensive understanding, it would be required to conduct several pilot studies and compare their results. Additionally, as a methodological consideration, the process of developing and testing a tool could ideally involve iterative loops, allowing for adjustments to the tool between each trial. In essence, drawing general conclusions based on the small sample in this Master's thesis is difficult given the limited scope of the study.

The pilot study introduced an element of subjectivity when I transitioned from being an observer in the room to actively facilitating the workshop. This shift implies that my personality and approach might have influenced the architects' experience. To mitigate this potential challenge in future applications of the

method, conducting multiple trials with different individuals facilitating the workshop could provide a more nuanced and objective understanding of the tool's effectiveness.

Finally, another challenge with the method in this thesis, was the limited amount of time available to borrow the participants during their workday for the pilot study. Because of this, the evaluations became less profound than desired. It became clear during the workshop that the amount of time (1,5 hours) was a bit too limited to have time to properly dive into each step of the translation tool and have time for evaluations in the end. Additionally, having the opportunity for a more in-depth qualitative interview with each participant after the workshop would have been valuable for a comprehensive understanding of the participants experience, offering insights beyond the constraints of the workshop timeframe.

However, many of the challenges outlined, also reflect constraints presented in real-life settings. The literature review highlighted how scarce amounts of time and resources are often appearing conditions in architectural practice (Sylvester, 2016; Kirkeby, 2010, 2012). Meaning that even with an optimally layouted translation tool, there will possibly still be challenges with finding time for the sketching architects to properly engage with it. In this regard the research method proves highly suitable for gaining insight from real-life practice and comprehending the inherent limits and challenges when aiming to build a bridge between the field of environmental psychology and architectural design practice.

5.1.1 From theory to tool - The translation process

The objective of the Master's thesis was to gain insights through actual testing, exploring the process of translating research findings into more applicable knowledge for use in practice. The complexity of the environmental psychology field, acknowledged as a potential barrier in the background chapter (see p. 7), was indeed a notable aspect when actively engaging with the theoretical concept to be translated.

Affordances was highlighted by several researchers to be a relevant concept for architectural practice (Maier & Fadel, 2015; Sylvest 2016; Kyttä 2003, 2004). As described by Maier and Fadel (2009) the concept of affordances has a generality to it, which makes it relevant for many different types of projects in various scales. However, this broadness also turned out to make it a challenging concept to grasp and explain. In the literature review it soon became evident that there exists an array of interpretations of the concept. It was comprehensive work both to map out the various aspects, and even more so to create an overview identifying which aspects might be relevant for sketching architects, and how those could be framed for practical application in the architects'ongoing project. Many of the research articles needed to be transformed from almost philosophical questions (such as the duality between the individual and the surrounding, and the existing of one without the other, as mentioned by Costall, 2012; Costall and Richards, 2013) – to

concrete hands-on useable extracts (such as *'Does the design afford possibility to regulate one's surroundings?'*).

Transitioning from academic research to applied research poses challenges in controlling the accuracy in the translation of the knowledge. Research articles undergo multiple layers of interpretation, beginning with the selection process where certain aspects are chosen from a broad range of academic insights, and followed by the translation into a format accessible for a specific user group (in this case sketching architects). This process demands time and an understanding of both academic and practical perspectives. In this Master's thesis, my background as a sketching architect was leveraged to extract relevant knowledge and contextualise it within the world of designers. However, it is crucial to recognise that the scientific validity of the translation is a both subjective and unverified when done in this way. Consequently, the chosen theoretical aspects for the tool's content in this thesis would likely differ if another person were to undertake the same exercise of extracting and translating aspects from the concept of affordances. Thus, the process inherently takes an angle on the research, influencing both the selection (highlighting certain aspects while others are left out) and the translation into architectural language.

The large gap between the knowledge architects typically works with and the format of the academic research, as described in the beginning of this assignment (see *1.2.3 The format of academic research as compared to practice*, p. 8) became evident during the development and testing of the translation tool. The overall conclusion of the tool was that it became too complex and comprehensive for architects to engage with independently (see section *5.3 The translation tool for the architects to engage with independently,* p. 63). But, on the other hand, from an environmental psychology standpoint, the translation procedure simplified the research to a significant extent, which could prompt doubt about whether essential nuances become lost in the process.

This situation presents a substantial ambiguity—striking a balance between making the tool sufficiently accessible for the user group of sketching architects to intuitively apply, without the need to spend too much time and mental capacity on, it while maintaining fidelity to the underlying research. The challenge lies in avoiding oversimplification to the extent that the tool loses accuracy and no longer faithfully represents the foundational research.

To make the connection between academic research, to applied research more valid, perhaps it is preferable to have a group of experts from both fields, to do the selection and translation together. Kirkeby (2009, 2012) stresses the need for researchers to understand how to present their material in a format that correlates with how practitioners normally gain insights – in this case to ensure that research can produce knowledge which feeds directly into the design process. If environmental psychologists think more in this way, they would be able to stay in better control of how their research findings becomes translated for the use of design processes.

5.2 Getting into practice

As this Master's thesis seeks to explore the integration of environmental psychology into design practice, one of the key elements seems to be to understand the characteristics of the target group of sketching architects, and the organisations in which they operate.

The introduction chapter described that architects in general are put under a lot of pressure from clients and market demands, solving complex projects under tight timeframes and constant deadlines (see *1.2.1 Lack of time and resources* p. 6). The fact that time and resources are often scarce within the building industry was highlighted, and also became evident when performing the pilot study. One of the challenges in relation to this, was quite practically to find a suitable time slot, where a design team had capacity (mentally and timewise) to engage with new input, but where the design was still open for altering's (meaning not too close to the end of a sketching phase, as much of the design would already be settled at that point).

On top of the high-paced work environment, a participant in the pilot study pointed out a potential new barrier – which is the fact that environmental psychology is far from the only field with an agenda to push towards the design team. In fact, the architects do not only have a brief and expectations from a client to fulfil, but they also must take into consideration input from various disciplines. This encompasses compliance with building regulations and among others insights from constructional engineers, fire engineers, acoustic specialists, and accessibility strategies. Additionally, architects must weigh the environmental impact of their designs, aligning with sustainability certifications and assessing factors such as micro-climate and shading effects on surroundings. Moreover, input and opinions from external stakeholders (such as building authorities, cities, municipalities, and investors) must be regularly attended. On top of this, there is normally a tight budget for the building, and the design needs to be continuously updated to fit within a firm economic framework. All those different agendas must be attended to, integrated, and coordinated by the design team during the relatively short design phases, creating a situation where they become the spider in the web, constantly juggling various aspects

Drawing from this insight, an argument can be made that architects face the risk of encountering 'requirement saturation,' continually navigating intricate and demanding requirements from diverse disciplines and interests. This potential challenge could, therefore, constitute a fourth barrier to the integration of environmental psychology into architectural design processes. Given that many of the aspects described above, such as regulatory requirements and financial conditions, are indispensable for project realisation, they can be categorised as 'must-haves.' In contrast, input from fields like environmental psychology, though valuable from a user perspective, is often perceived as a 'nice-to-have' in the current system. Taking this into account, it becomes apparent how considerations from environmental psychology risk being overshadowed amidst the multitude of other facets in the design process.

Lack of time and resources

The complexity of the field of environmental psychology

The format of academic research as compared to the knowledge architects normally use

'Requirment saturation' - complex and demanding requirements from various surrounding disciplines and interests
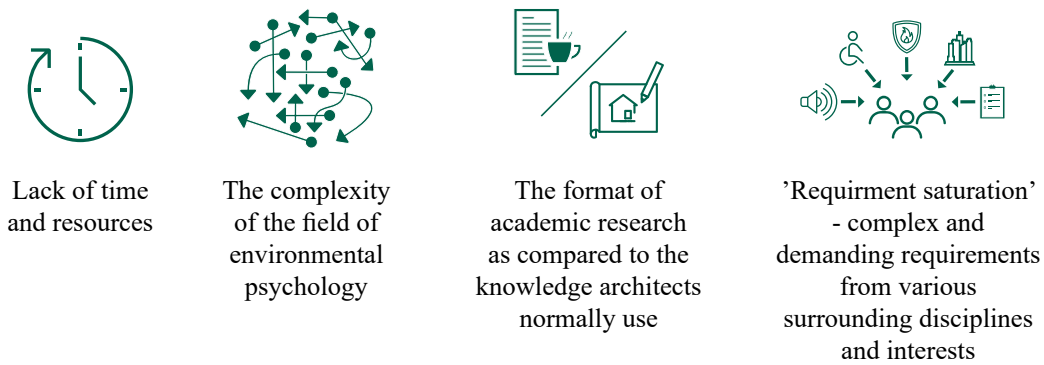
Figure 20. An updated visual overview of identified barriers between the field of environmental psychology, and architectural design practice – updated with a fourth barrier to far right.

As noted in the introduction (see *1.3 Reasons to bridge the gap* on p. 10), the increasing client demand for social sustainability and user-centric design performance, is likely to elevate the necessity of integrating knowledge from environmental psychology alongside other design considerations. Shifting this knowledge from a 'nice-to-have' to a 'need-to-have' status could presumably enhance the prospects of successfully implementing environmental psychology in architectural design. Moreover, the feedback from participants in the evaluation after the pilot study described environmental psychology as being less strict, easily relatable and fun. This presents a potential opportunity for the field, suggesting that if associated with a bit of creative freedom and design inspiration, rather than technical and prescriptive checklists - environmental psychology could possibly become an appealing and enriching companion to the architectural design process.

An alternative approach to situating environmental psychology within the practice workstream could be as a supportive instrument for other demands, as it has potential to go hand in hand with many of the existing requirements and ambitions. For instance, the building allowance process might progress more seamlessly if a project seeking approval demonstrates a focus on user experiences, such as creating a comfortable micro-climate in the surrounding context and enhancing biodiversity on the site. Another example of this could be a large green pocket in a central project space; it could address environmental psychology by incorporating restorative elements, facilitate wayfinding (*'let's meet at the green pocket!'*), while imaginably also enhancing air quality through the circulation of air with purifying plants. Ambitious daylight utilisation is another example where elements from environmental psychology and technical regulations can converge, potentially providing the architecture with a cohesive performance and narrative.

5.3 The tool for the architects to enage with independently

One of the main findings from the pilot study was the fact that the participating group of sketching architects did not interact with the worksheets of the tool, but instead expected to be verbally guided through the steps of it. As described in the result chapter, I ended up both explaining each step, assisting them to keep the brainstorm focused, as well as being the one writing down their findings. The reasons for the inability for the tool to function on its own (which was the original intention with it), can probably be explained by some of the findings from the literature review.

In retrospect the literature review described how architects in general prefer for an expert to come out to them, and share knowledge directly related to a specific project (Kirkeby, 2012). In relation to this, it is not suprising that it turned out to be less intuitive for the architects to engage with the translation tool independently, without the support from an external professional.

However, there are also other potential explanations for the lack of independent engagement with the tool, found in the research. First, the layout of the tool failed in not being enough adapted for dialogue. In the literature review it was emphasised that architects in general work in a team-based structure, meaning that the tool should have a format situated for this, preferably as a tool used through dialogue (Sylvest, 2016; Lawson, 2005). Even though this was the original intention, the tool in its layout ended up being built up around reading (to understand the concept of affordances) and writing (to summarise the findings). The challenge with this structure was not noticed in the pre-test of the tool, as this was done with only one participant. Here the tool worked well, in the sense that the individual sat down and read and followed the instructions. However, moving into the group of architects it became evident that it did not feel natural for them to sit down and read instructions in this way. In a group setting, they intuitively preferred a more guided approach, where someone would take command and talk them through the process.

The lack of the tool to succeed in being dialogue based is probably related to one of the barriers described in the introduction: the complexity of the field of environmental psychology. Sylvest (2016) stated that the main goal of a tool should be to comprise research findings and translate them into applicable understandings. Even though I had made use of my experience as a sketching architect to extract and summarise relevant knowledge from research articles – it still turned out to be too time consuming and comprehensive for the architects to engage with on their own. For instance, the layout in Step 2 of the translation tool, with the various lens sheets, in reality meant that the architects were presented with a stack of printed papers with various concepts. For them to look through all the pages - read, understand, and evaluate the relevance of each lens for their specific project, proved to be overly comprehensive within the constraints of a workshop format, particularly one lasting only 1.5 hours.

Further on, in the literature review, a visually inspiring layout was highlighted as one of the characteristics the tool should have (Ziesel, 2006; Kirkeby 2009, 2011). Architects are used to de-code content visually, and not through text, here the tool would probably have benefited from being less text heavy, and more visually attractive (for instance through the use of colours, larger icons/diagrams, and only shorter 'headline-style' text). However, compiling research findings to this format is a bit of a challenge, which was also highlighted in section *5.1.1 From theory to tool - The translation process.*

The overall format and layout of the translation tool appeared to be too extensive for architects to navigate independently. Given the acknowledged time constraints in their workday, along with the identified challenge of 'requirement saturation' expecting them to independently navigate first a user group matrix and hereafter an array of lenses with affordances, to finally summarise all the findings on an implementation canvas – was considered a quite demanding task for a design team fully focused on progressing enough before the next deadline.

Abstracting from the writing and reading-based format of the tool, which probably did not emphasise dialogue enough and might have appeared overwhelming to some extent to the architects, the content itself proved to be effective. When facilitated orally and in a more "free format", the architects in the pilot study demonstrated both the motivation and capacity to relate their design to various angles derived from the concept of affordances. Thus, the suggested limitation on the tool's user-friendliness, seem to arise more from the time-consuming and slightly unnatural nature of reading instructions, rather than any limitations in the architects ability or willingness to understand and relate to environmental psychology as a field. Perhaps translation tools intended for architects to work with independently might therefore be more effective when focused on narrower concepts within environmental psychology. While broader and more comprehensive concepts could potentially be more naturally integrated into the design process with the guidance of an expert from the field actively engaging with the architects.

5.4 The tool as a framework for a facilitated workshop

As described, one of the main findings from the pilot study was that the translation tool did not work independently as first intended. Instead, the tool turned out to be used as a framework for me in the role of a workshop facilitator. In light of this finding, it seems relevant to also review the tool for how well it functioned as a sequence of steps for the architects to work their way through, under guidance from a professional from the field of environmental psychology.

The overall structure of the tool, commencing with a shared definition of the primary user groups, proceeding to a brainstorming session on various affordance themes, and concluding with a summary, was perceived as logical by

the participants. It felt natural to guide them through this sequence during the workshop. From a facilitator's perspective, the lens sheets worked as a library of angels to choose from when navigating the discussion. The lenses seemed to work well in being able to break down the field of affordances into more focused discussion points. The fact that each lens sheet narrowed down the focus, and offered suggestions about what the design should be able to do for a specific user group, appeared to support the architects' creativity. Simultaneously, the cumulative effect of the lens sheets provided a comprehensive insight into how affordances could be integrated into the project, encompassing various user groups and perspectives. In this regard, the tool's structure facilitated a manageable brainstorming process on the concept of affordances, framing it from multiple perspectives, and the summary of the findings emerged as thorough and rich in ideas.

Considering the translation tool as a support for a workshop facilitator opens up new possibilities. The lens sheets could be imagined as further extended, creating a library of various angles that the facilitator could choose from for different projects. The layout of the tool was created with the purpose of being able to go beyond the concept of affordances, allowing for the addition of other theoretical aspects on new lens sheets. In this manner, the translation tool could serve as a catalog of theoretical input, enabling a facilitator to make a curated selection for each workshop based on the specific needs and focus of the project at hand.

The content of the tool seemed to engage the architects, when presented by a facilitator. In the literature review it was described that that the tool should provide a flexible input, to support the sketching architects to reflect and gain new knowledge through working actively with the tool, and hence become small researchers themselves (Lawson 2005, Schön 1983). Based on this, my belief is that the process of brainstorming together when working with the tool both sparked the curiosity of the architects, but also, very importantly, provided them with a sense of ownership of the discoveries. It seemed that the findings, emerging from within the design team, motivated the architects to incorporate these conclusions into the further design process.

The workshop format itself presented several advantages aligning well with the aim of this thesis, effectively addressing barriers to the incorporation of environmental psychology in architectural design processes. It proved to be time-efficient, while making the complex field of environmental psychology more accessible to architects. The workshop generated project-specific outputs in a language familiar to architects and gave them a sense of ownership over their findings. This approach in a way builds upon the involvement of a specialist, as emphasised by Kirkeby (2012) as the preferred way for architects to gain new information related to a project.

Finally, the workshop format provided some positive side advantages. The architects in the pilot study expressed great appreciation for the possibility to sit down and solve design tasks together in a *'safe forum'*. They expressed

that it strengthened their feeling of being part of a team, by meeting around a themed discussion and agreeing internally in the group on a design direction. Further on, having investigated the design through several lenses the team now knew quite a lot about the specific design, which one of the sketching architects concluded '*would have saved a lot of sketching time, if done earlier*'. In summary, the workshop format could provide both a design direction, but also instilled confidence within the group. The architects agreed on a direction, and they felt that because of the translation tool, they now had some research backing, strengthening their arguments for the design choices moving forward.

Within the right organisation, it is not unlikely that there is a possibility of combining the two utilities of the translation tool, making it usable both independently and as a structure for a facilitated workshop. For example, if an architectural office has an internal expert in environmental psychology, that person could serve as a facilitator for workshops while also training architects to use the translation tool more independently. Moreover, participants in the pilot study noted that tasks are often divided, and architects engage in individual sketching. In such cases, a translation tool could potentially empower a solo sketching architect, by offering frameworks for incorporating research as guidelines, and hence strengthening design arguments.

5.5 From tool to design – Reflecting on the outcome

The evaluation of the result of the pilot study (*4.4.4 Evaluating the reliability of the outcome of the tool* see p. 56) suggested that the summary list generated by the group of sketching architects was sensible from an environmental psychology perspective. It was evident that the group had taken the user experience into consideration when interacting with the tool. Additionally, the evaluation revealed that architects infused their own artistic interpretations into some insights, transitioning from general findings to concrete design suggestions, for instance *'Reception desk should be architecturally read as one large sculptural object, an exclusive shaped art element'*.

However, there are several factors that make the validation challenging. First, as previously described, the theory of affordances is in itself interpretable in different ways. Both Costall (2012) and Sylvest (2016) depicted an array of various understandings and fields of application of the concept, some quite far away from Gibson's original thoughts. This means that it is difficult to objectively evaluate if the way the architects has worked with and interpreted the concept is right or wrong. Considering the complex nature of environmental psychology as a field (see *1.2.2 The complexity of the field of environmental psychology* p. 7) this openness and vagueness in application, and difficulty to define a valid result, is possibly the case for other concepts from the field as well.

Therefore, to be able to evaluate the reliability of the outcome of the translation tool, it might be important to go back to the primary intention of creating it. In

this case, the tool was created to assist practicing architects in designing a more user friendly experience. Assessing the summary list (presented on p. 53) with this overarching goal in mind, rather than focusing exclusively on affordances, might provide a clearer perspective. In the pilot study, all the suggestions in Step 3 appeared to be rooted in a thoughtful consideration of the building future users, which could, in itself, be a success criterion.

However, after this conclusion comes the next step in reviewing the creation of a bridge between environmental psychology and design practice. In the initial part of the discussion chapter, there was reflection on the translation from theory to tool; a comparable reflection should likely be undertaken for the other half of the process — from tool to actual design.

In the background chapter, it was emphasised that tools should inspire architects rather than dictate the design in a certain direction (Sylvest, 2016). This approach seems to align with the "nature of architects" and the way they engage in design processes, emphasising the importance of instilling a sense of ownership over ideas. However, it raises a crucial question: when the design is not directly influenced, how can we ensure the validity of the design outcome derived from the translation tool?

Not only is it a bit challenging to validate the findings concluded in Step 3 of the translation tool, further on, the architects are themselves hereafter in charge of interpreting the input they have gained through engaging with the tool, into concrete design suggestions. In this procedure the traditional academic research only indirectly becomes used, as inspiration for their artistic expression and craftmanship. Meaning that the results of the design process in the end potentially could end far away from the original research knowledge that the translation tool was based upon.

A hypothetical example of this situation could involve an architectural team, having worked with the translation tool, expressing a desire to incorporate a water feature into their design to afford restoration. The architects may indeed integrate a water fountain into the project, but it could have sharp angles and corners, be made of hard, cold surfaces, have bright illumination and inappropriate sound levels. From an environmental psychology perspective, this design suggested may not fully capture the restorative potential of water. An expert from this field might consider factors such as shape, surrounding context, and acoustics, aiming for a more calming, harmonic and nature inspired design. However, the architects may perceive that by adding a water feature, the project is now "environmental psychology approved."

An answer to this challenge could perhaps be having a professional from the field of environmental psychology to work internally within the architectural office, following the design process all the way. This could potentially support the actual design outcome to be more in line with deeper understanding from research findings. Nonetheless, one could also argue that the addition of a water element, even if a bit

unfortunate in its design, still might be better than none at all, looking from a user's health and well-being perspective. In this case the whole discussion again comes back to what our initial goals are, and how the design suggestion meets those.

While acknowledging the challenges in validating the results of the translation tool, as elaborated above, it is also worth considering how Gifford (2014b) described the huge potential for the implementation of academic research from the field of environmental psychology, and the current potential costs of not using it. Reflecting on the initial intention of creating the tool to support a more human friendly design, one could argue that even a less-than-optimal implementation of research is likely preferable to the absence of user group considerations prevalent in many architectural projects today. Hence, making the architects consider the users from various angles, might be a success criterion in itself - despite the exact design outcome derived from this.

5.6 How do we make sure that the ideas stay in the project?

When working with the translation of environmental psychology into architectural practice, the challenge extends beyond providing architects with input and ideas from the field. A significant issue lies in ensuring that the generated input, such as ideas from a workshop, remains integrated into the project throughout the whole process. Zeisel (2006) highlighted the dynamic nature of the design process, characterised by ongoing discussions and re-examinations of design solutions, creating new loops in various directions with short notice. The nature of this process suggests that ideas from the environmental psychology field incorporated at an early stage might be overlooked, altered, or even lost as the project moves along. As environmental psychologists, it's essential for us to reflect on how to address this inherent unpredictability of the architectural design process.

Some aspects could reasonably support the process related to the translation tool and the workshop format. First, if an expert from the field of environmental psychology could follow the architectural design process regularly, this person could maintain an overview, identify opportunities arising from new design directions, remind architects of earlier findings, and suggest how those insights remain relevant even if the design takes altered directions.

Secondly, the way the findings from the workshop are summarised at the end of the translation tool, is probably also important. In the early stages of the process, it might be beneficial to work with deeper ideas that are adaptable to different design solutions and not necessarily tied to a specific design concept. Examples of this approach could include statements like 'XX% of the surfaces should have some greenery' or a catalogue of spatial settings, materials, architectural elements or colours that architects can work with, regardless of whether the overall volumetric concept changes or adapts.

Thirdly, another finding from the pilot study was the strong sense of ownership felt by the architects within the team, described by one participant as *'a common and clear vision.'* The team's request to include the project's responsible partner in the email with the summary list suggesting a need to anchor the new ideas higher up in the project organisation.

In this context, suggesting that the participation in the workshop leads to a feeling of ownership of the findings, the choice of participants for each workshop becomes important. Perhaps having someone high up in the architectural organisation, or even external stakeholders and clients – could potentially be a way of anchoring the findings from the translation tool in the broader organisational context around the project. This, in turn, might increase the willingness to allocate resources for implementing insights from the field of environmental psychology into the project.

6. Conclusion

The overarching objective of this Master's thesis has been to explore a way to bridge the gap between research from the field of environmental psychology and architectural design practice. As a means of investigation, a translation tool based on the concept of affordances was developed, tested and evaluated in a pilot study involving a design team within an architectural studio.

Building on insights from the literature review and the pilot study, grasping the 'nature of architects' and the environment in which they operate, emerges as a crucial aspect in constructing the bridge. Architects, in general, are oriented toward practice, working within production-focused and time-constrained frames, while at the same time serving as key coordinators juggling requirements from various fields (from planning authorities, to engineering and sustainability certifications). Consequently, they prefer acquiring knowledge from experts coming to their practice, addressing immediate challenges associated with their ongoing project. This understanding sheds light on the unexpected finding in the pilot study that the translation tool took a secondary role, and the facilitated workshop itself became the focal point of interest for the architects.

Engaging an environmental psychology specialist in workshops with architects emerges as a promising strategy to bridge the gap between the two fields. In this context, translation tools (such as the one created within this Master's thesis) are envisioned to potentially serve a role as providers of structure and frames to translate the academic knowledge of environmental psychology into a more practically applicable language. However, the primary benefit seems to arise from establishing a forum where architects, under guidance, can engage in discussions about their design from a user perspective and take ownership of design solutions inspired by the field of environmental psychology.

This study suggests that by adopting this approach, we directly address the nature of architects. Participants in the pilot study expressed increased confidence in their design and a shared vision within the team. It is hoped that this approach can be a step forward to better integration of research in practice. Nonetheless, further studies are undoubtedly needed to validate and expand on these findings.

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