Perceptions of Log and Log Buildings among Finnish Architectural and Building Industry Professionals

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Abstract
Log as building material is undergoing rapid technological changes due to the introduction of industrially developed lamella log. This new material expands the technological repertoire that is available to architects when designing with log. Furthermore, various societal trends relating to ecology, occupant health, and contemporary architectural expression are potentially altering the status and desirability of log as a building material. Thus, from the point of view of architectural research, the log as a building material should be re-investigated. In this paper, our aim is to scrutinise log and log construction through exploring *how log is currently perceived as a material among Finnish building professionals*. For this purpose, we analyse interviews conducted with 15 professionals in Finland. To gain these research materials, we utilised a method where a traditional semi-structured interview is combined with an in-situ interview in a pavilion construct built by our research team. We complement these materials with brief reviews into wood research and the history of log construction in Finland.

Keywords: log building, log architecture, architects, building industry professionals, design ethnography, interviews.

Introduction
There can hardly be a more traditional building material than log in the boreal areas of the world. The use of this ancient material saw a significant decline in the 20th century as novel building materials and construction methods prevailed. However, in recent decades the humble log has become an object of industrial research and development work. The contemporary industrially produced log, then, is a piece of engineered wood that could be argued to have more in common with cross-laminated timber than traditional logs, which have been hewed from a single tree trunk. This enables novel architectural uses of the material, but also raises many interesting questions regarding the use and non-use of log as a building material. Furthermore, it can be argued that in the previous decades, the architectural quality of log buildings has been mostly

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rather poor. Industrial log has so far been used in very few professionally designed public buildings. For the architectural field, then, there is a distinct need to research and develop log as a building material.

In this paper, our aim is to scrutinise log and log construction as a phenomenon, and to explore the question of *how log is currently perceived as a material among Finnish building professionals*. For this purpose, we analyse interviews of 15 professionals in Finland, utilising a method where a traditional semi-structured interview is combined with an in-situ interview in a pavilion construct built by our team (e.g. Denzin & Lincoln, 2005; Evans & Jones, 2011). This paper, then, focuses on Finnish professionals, and attempts to gain in-depth understanding of how they, as individual professionals, view log as a building material. To support our analysis and discussions of these materials, however, we will first examine briefly some related work.

Studies on experiencing wood as a building material

While we were not able to find many studies of log in particular, numerous studies have been conducted in several fields concerning the experiential effects of wood. Indeed, log research can be seen as a subset of wood research in general, thus, the issues overlap greatly, and the results gained in wood research can offer useful viewpoints into log as a material. Overall, these studies on experiencing wood seem to be physiological, psychological and cultural in nature.

All in all, wood is often seen as being “warm” and “natural” (Rametsteiner et al., 2007). This finding has been explained in two ways: it might be due to the coloration or hue of the material, which reflects long-wavelength light, and possibly because it produces only minor amounts of UV radiation from its surface; this might provide less stimuli and provide a sense of relief (Masuda, 2004). For the most part, wood has been found to have positive or neutral effects in these studies (Jensen et al., 2001; Guo et al., 2002; Gasser, 2001; Sakuragawa et al., 2008; Morikawa et al., 1998). While many of these studies quantify individuals’ responses in terms of biological markers, many researchers also utilise integrative strategies, which include psychological aspects (Beatley, 2000; Pearson, 2001; Kellert, 2005; Kellert et al., 2008) According to some studies conducted within environmental psychology, it would seem that participants prefer natural scenes and environments to non-natural ones (e.g. Kaplan et al., 1972). This phenomenon has been dubbed *biophilia* (Wilson, 1984; Kellert, 2005; Kellert et al., 2008). Some explain this affinity towards nature through the fact that natural elements are possibly seen as nonthreatening (Kaplan & Kaplan, 1989; Ulrich et al., 1991; Hartig et al., 1997). Whatever the reason, this effect seems to work well, since natural video scenes have been shown to promote restoration from stress (Ulrich et al., 1991; Parsons et al. 1998; Laumann et al., 2003). While our approach here is different, all of the physiology and psychology-related research in wood has obvious implications for log as well if we are to design indoor environments that support occupant well-being.

Additionally, many cultural meanings have been found to be in connection with various types of wood. Rametsteiner et al. (2007) have shown that for Europeans, wood in general is a natural, warm, healthy, good-looking, easy to use and environmentally friendly material. These meanings can also be gendered: oak is seen as a masculine material (Blomgren, 1965). Indeed, people seem to even hold notions of wood that are more issues of reputation rather than of direct experience: individuals’ perceptions of the genus of wood and the actual experience of a real sample of wood have been shown differ markedly (Bumgardner & Bowe, 2002). Furthermore, the various uses of wood in living environments have been studied. For example, indoor environments with natural elements are usually highly regarded (Bringslimark et al., 2007). Furthermore, the treating of wood has also been studied: oiled wood floor was perceived of as more pleasing than oiled parquet and lacquered parquet (Berger et al., 2006). Thus, experiences of wood as a building material are

highly context-driven, and the various cultural notions of the genus of wood and its surface treatments have an effect on how it is perceived. Some studies have also compared wood to other materials, such as composites that imitate wood products: These are seen as unnatural, processed and unlike wood in comparison to real wood samples (Jonsson et al., 2008). Thus, the experiential value of wood products renders the material very desirable, but the perceived value of composites might be compromised. This warrants further research into log and especially the lamella log as a material.

While these studies indicate towards some interesting features that log as a wood material might have, these studies do not deal specifically with log. Thus, *there is a major gap in knowledge concerning experiences of log as a specific subset of wood.* Secondly, the literature cited here seems to heavily focus on lay person participants; it *does not address the perceptions or experiences of professionals.* Our study here begins to address these two gaps in knowledge. Our approach could be described as being experiential, empirical, designerly and culturally informed.

Log and timber as cultural concepts

Our study is embedded into its Finnish cultural context, since our original research materials, participants as well as ourselves are all Finnish. Additionally, the research also took place in Finland, and log is a very traditional building material in the country. Thus, the Finnish terminology on the subject of log and timber has played a major part in how the subject has been understood in this context. Usually, the Finnish word *hirsi* is translated into English simply as ‘a log’. However, according to a dictionary definition, a log is “a part of the trunk or a large branch of a tree that has fallen or been cut off.” (Oxford Dictionaries, 2017a); thus, a more accurate Finnish equivalent of this definition would be *tukki*, a log or trunk that has usually already been felled. To be precise, then, in the Finnish language, *tukki* becomes *hirsi* only when it is hewed, or otherwise prepared to be used in a building, or already in place in a log building. If used in some other kind of building as a singular element, it is merely a beam. The dictionary definition for the English word ‘timber’ is “wood prepared for use in building and carpentry.” (Oxford Dictionaries, 2017b). This resembles the definition of the Finnish word hirsi since the tree trunk must be subjected to further production in order it to become timber. However, timber can refer to a wide variety of other wood products. This is not the case with *hirsi*; it only is used in the context of log building. These subtle differences inform our participants’ views, our interpretation, and our reporting in this article. It should be borne in mind that within this article, we are mainly discussing log and log building in the Finnish sense of *hirsi*.

The historical significance of log construction in Finland

The significance of log construction in the history of the Finnish built environment cannot be overemphasized. The simplest and most commonly used technique in log construction, the half-lap joint spread in the country during the 7th century from the southeast of Finland. Log buildings of some sort had existed in Finland long before this, since some 5000-year-old residential constructs made out of horizontally laid tree trunks have been reconstructed based on archeological findings and observations (Vuolle-Apiala, 2012). Virtually all buildings of practical use in Finland were built out of logs until the beginning of 20th century (Jokelainen, 2005).

The appreciation and status of log has shifted during the various historical periods in Finland. According to Jokelainen, three different periods can be established based on the status of log. First, the period of peasant builders, which lasted until the middle of the 19th century. This was followed by the beginning of industrialization in Finland at the turn of the 19th and 20th century. The last is the period of modern industrial production beginning from the 1950’s. Each period has produced its own kind of architectural expression and affected Finnish people’s attitudes towards log building according to Jokelainen. The first

period was characterized by the wooden churches of Finland. Due to the arrival of Christianity in Finland in the 12th century, demand for these large, high-quality buildings was created. These were built by skillful and professional craftsmen and required a high level of craftsmanship. The architectural styles of the time – which imitated stone or brick churches, which were considered more valuable materials – were adapted to wooden church architecture making them truly unique pieces of architecture. The architectural and structural solutions of wooden churches developed and discovered by professional builders were then embraced in more everyday buildings of the time. During this period the general attitude towards log as a building material was highly approving. (Jokelainen, 2005)

In the beginning of the 20th century, the traditional image of log became a disadvantage. In the rapidly industrializing nation, a material that represented values of past times was readily abandoned (Jokelainen, 2005) and the generations of church builders faded away, resulting in the gradual vanishing of the orally transferred knowledge related to building log churches (Soikkeli & Koiso-Kanttila, 2006). Since then, excluding a few rare exceptions of wilderness ateliers of Finnish artists and Lapland tourist attractions, log constructions were mainly used only in secondary buildings, such as summer cottages and sauna huts (Heikkilä, 2002). In these buildings the structures and joints were basic and simplified and based on these solutions the industrial production of log buildings was developed from the 1950's onwards (Jokelainen, 2005). After the reconstruction era, separate practices, differing from building with other techniques, had been developed in industrial log production: No professional designers were used, no research was conducted, and there was no formal education to enter the industry (Jokelainen, 2005). Planning and building officials' attitudes towards log were also critical. According to Heikkilä (2002), the problem was not the material itself but the poor design of these recent log buildings. Furthermore, recent building regulations concerning insulation and energy efficiency have limited the use of log in Finland (Jokelainen, 2005). To summarise, then, log as a building material has suffered a long decline in Finland from the glory days of the pre-industrial society to the present day.

There are several trends in construction that are currently affecting wood and log construction globally. Firstly, since the turn of the new millennium, the ecological aspects related to wood have increased its popularity as a building material (Minke, 2009; Ritchie & Thomas, 2009; Bergman & Bowe, 2008; Upton et al., 2008; Dodoo et al., 2009). Secondly, especially in Finland, log as a massive, homogenous material has gained a reputation as a structurally safe and healthy method of construction. From this perspective, log is seen as a safeguard against moisture-related problems, which often result in microbial issues. Third, some international architectural trends that can be observed to have become popular; these current trends have encouraged a type of architecture where large masses of homogeneous materials are used, and these have resulted also in some interesting contemporary log and wood buildings, e.g. Final Wooden House by Sou Fujimoto, Haus Luzi by Peter Zuthor or Norwegian Wild Reindeer Centre Pavilion by Snøhetta.

Importantly, the fact that the production technology of logs has evolved a great deal leads to yet another interesting contradiction in utilizing the word log. Contemporary industrially manufactured logs are commonly manufactured by gluing smaller pieces of wood together. Thus, they begin to greatly resemble glued laminated timber, which by definition is "an improved form of solid timber in which the growth-related defects in the wood that tend to reduce the strength have been partly eliminated. Glued laminated timber consists of at least three dried softwood boards or laminations glued together with the grain parallel." (Herzog et al., 2012) Technically there are very few differences between these two, but the log house industry in Finland uses the word log to describe their laminated, log-shaped products. This raises an interesting issue for our research.

Thus, in addition to the two gaps in knowledge we identify complex history of log in Finland, the changes in ecology, safety and architectural trends, as well as the rapid technological changes in the material serve as the motivation and background for our study of Finnish professionals' perceptions, attitudes and views of log as a building material. For this purpose, a study setting was devised; we will describe this next.

Study setting, materials and methods

Our overall study setting and method consisted of a two-part semi-structured interview in an architectural pilot construct, the Timber Tetris pavilion (Hirsitetris in Finnish). The study and the pilot pavilion were carried out within Modern Log City project, which is a research project conducted in 2016–2019 in Oulu School of Architecture, University of Oulu. The objectives of the project are to investigate and develop new kind of architectural expression for log buildings suitable for urban environment, to study the utilization of mass-customization in the design process of log buildings and to research the life-cycle economy of log buildings.

Timber Tetris pavilion in the city centre of Helsinki

As a part of architectural education in Oulu School of Architecture, a workshop for architectural students was organized aiming to design and construct a summer pavilion for the Museum of Finnish Architecture (MFA) in Helsinki. Also building architect students from Oulu University of Applied Sciences were invited to participate to workshop. The assignment was to design the pavilion using log as a building material. The intended use of the pavilion was to be an event space for the museum for the summer. Altogether 37 students took part in the design phase. Students were divided into seven groups, of which each group during the week made one proposal for the design of the pavilion. After the design week, the pavilion's design was developed further by the tutoring teachers and also the future user of the pavilion, MFA, was involved. The final design could be seen as a synthesis of the student groups' proposals, containing the best and most interesting as well as suitable elements and features of the proposals. Among other things, the pavilion also got its name, Timber Tetris, from one of the proposals.

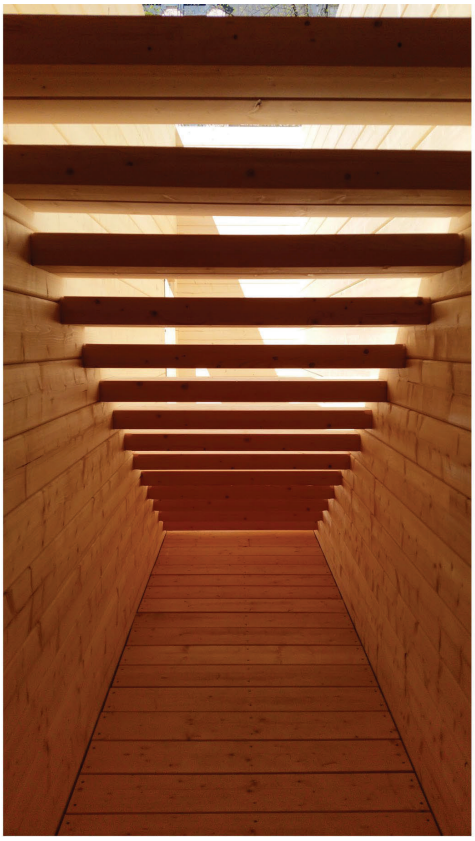

Figure 1. The Timber Tetris pavilion in the urban square (Copyright Aki Markkanen, used with permission), and Figures 2-3 interior pictures from underneath the staircase and from the hallway space (Copyright Matti Lakkala, used with permission).

In the second phase of the workshop the pavilion was constructed by the students. Logs for the pavilion had been manufactured in advance in order to get the pavilion erected in five days by students. The pavilion is constructed of industrially produced spruce logs, which are 90mm in width and 185mm in height. The appearance of the pavilion is very simple. It is a rectangular block of wood, into which the inside spaces are carved.

Participants

Altogether, we interviewed 15 professionals who operate in the building and architectural design industry. These included four architects in design practice, four architects employed as officials in urban planning and building permissions, four architectural students, and three professionals in the log building industry. Our sample included both women and men (seven and eight, respectively); however, we must point out that all officials were women and private sector design practitioners were entirely male. We attempted to recruit male officials as well; however, it was female officials who responded to the request. Furthermore, we wished to recruit design practitioners who were owners or partners in leading firms; the prevalence of males in these positions might reflect a situation in the field especially among older generations of architects. We did attempt to contact a young female architect who is a partner in an emerging practice; however, we were unable to get a response from her. In our future studies, more attention should be paid to achieve a more even representation of sexes in our materials.

Due to the inclusion of students as well as seasoned professionals, the age range of our participants was very wide, ranging from individuals in the twenties to mostly middle-aged, with the inclusion of one non-retired senior individual. Thus, the study achieved a well-rounded sample of individuals with varying education and employment backgrounds. This enabled us to gain a broad range of individuals' views and experiences.

Table 1. Breakdown of participants, occupations, gender and age ranges.

Educational background/profession:	*Female/male*	*Age range*
Design practitioner #1	Male	40-49
Design practitioner #2	Male	30-39
Design practitioner #3	Male	70-79
Design practitioner #4	Male	60-69
Official #1	Female	40-49
Official #2	Female	60-69
Official #3	Female	30-39
Official #4	Female	60-69
Industry representative #1	Male	50-59
Industry representative #2	Male	50-59
Industry representative #3	Female	40-49
Architectural student #1	Female	30-39
Architectural student #2	Male	20-29
Architectural student #3	Male	20-29
Architectural student #4	Female	20-29

Research methods

The semi-structured interview was deemed an appropriate method for gaining knowledge about professionals' attitudes, views and opinions. Our interview protocol consisted of a two-part semi-structured interview (e.g. Denzin & Lincoln, 2005). The first part was carried out in a café in central Helsinki, in close proximity to the Timber Tetris pavilion. This part included questions relating to. e.g., the *image of timber log building and timber log as a material* among professionals; participants' professional and personal *experiences of use and non-use of timber log*; and professionals' views of *the technical aspects of timber log, such as safety, expense, and ecological aspects*. The second part of the interview was a go-along style interview in which participants were taken to the site where the pavilion stood. They were instructed to speak freely of any thoughts that would arise, but also prompted through questions relating to the *general architectural quality* of the build and how it related to its urban surroundings; the *detailing* of the pavilion*; the lamella timber log material itself* and whether participants saw it as being log; and any *suggestions for improvements* that participants might have. The pavilion enabled us to discuss specifics relating to the material, its detailing, structural solutions and how the pavilion fit into the urban streetscape. We also asked the participants what their dream building material would be like.

We employed an audio recorder to record both the first and the second part of the interview. Additionally, for the second part, we used a portable High Definition action video camera (GoPro) which hung from the interviewer's neck. This enabled us to capture any gestures the interviewees would make. All in all, this method yielded roughly eight hours of audio material and eight hours of video material. The audio was subsequently transcribed into 146 pages of text documents which were utilised for close reading of the material. The video was used as a visual aid in the analysis.

The analysis approach we have followed can be described as abductive (Kolko, 2010); i.e. we did not have any prior theoretical concepts guiding this exploratory research. This is due to the fact that our aim was to remain open to all opinions, ideas and experiences that our participants have. This was reflected in the wide, holistic manner in which questions have been devised and results analysed. Through several readings of the material, both as singular narratives, and through comparing accounts across several individuals, we have allowed themes and issues to emerge. These issues, however, are here discussed through the lens of relevant literature.

This overall method has some natural limitations which should be considered. Firstly, all of our participants, as well as ourselves, are Finnish; thus, the results reported here cannot be considered to reflect prevailing attitudes and experiences elsewhere. This is normal as building is a holistic effort that necessarily engages with local culture, including practices, traditions, and experiences, and local physical issues, such as climate and weather. Secondly, all interviewees were professionals in the building industry; thus, no conclusions can be drawn concerning laypersons. We have conducted a prior survey (Juuti et al., 2017) regarding these. Third, as this is an in-depth qualitative study, the sample size is necessarily small, and thus, the results should not be interpreted through a quantitative lens.

Perceptions of log and log building

Overall, our materials confirmed the importance of studying perceptions of log and log building, as there seemed to be a prevalence of strong images among these professionals, and comparatively little experience in constructing with log, excluding those who were explicitly working within the log industry. Next, we will present the results of our semi-structured interviews by presenting findings that arose from the research materials.

Both traditional and contemporary

It was strikingly clear from our material that the participants viewed log as very traditional material. This was also evident in what would ideally be desirable for them in a log, exemplified by statements such as: “Ideally, I would like it to be traditional log, solid wood” (O1), “A hand carved log is a genuine log to me, it’s one piece of wood and made by hand.” (O2) However, the log industry representatives, rather understandably, highlighted the shape of the material rather than its composition. This definition of a log as a long-shaped piece of wood is naturally also consistent with their everyday experience. As stated, other participants had less real-life experience with log; as such, their perceptions can be viewed as being more idealised. Some participants accurately highlighted the use of log; it must be used in a way where logs are stacked one on top of the other. Log, then, must meet at least three requirements to be real log: material, shape and use-context.

Furthermore, log was also seen as a “tried and tested” (D2) material, used for millennia by vernacular builders. This was also connected with the idea of homogeneity, which was seen as not only healthy, but as a timely and trendy attribute. One official was especially adamant in her opinion that the general public wants “buildings that they can understand” (O4), and this, for her, seemed to be the prime reason that made log a very interesting material. Thus, there seems to be a connection here between vernacular building and current high-end architecture trends that might breathe new life into log as a building material.

However, while these attributes of traditionality and trustworthiness were expressed unfailingly in a positive light, the log shape that was seen as being the most traditional, i.e. round log, was seen as very undesirable by our participants. Among these professionals, then, we can identify a sort of a seemingly contradictory principle. Within this logic, it is desirable for materials to be traditional; however, its form-factor and architectural use should ideally be contemporary, or perhaps even avant-garde. This combination, we suspect, is a deeper, underlying principle. Our argument here is supported by the participants’ view, wherein they saw that the Finnish log industry had marred the reputation of log as material in the previous decades. In these previous decades, log cottages and houses were often highly traditional in their overall appearance but built with industrially produced round logs and square logs that lacked the roughness of hand-carved logs.

Thus, the following principles might be drafted from our participants’ statements overall:

> ***Traditional material – Contemporary architecture*** *seems to have generally positive connotations*
>
> ***Contemporary material – Contemporary architecture*** *seems to have generally positive connotations*
>
> ***Contemporary material – Traditional architecture*** *seems to have generally negative connotations*
>
> ***Traditional material – Traditional architecture*** *was not even considered by our participants; this would require further research*

Overall, then, log was also seen as a very relevant, contemporary material by these professionals. The trend towards homogeneity in current architecture, as discussed above, clearly affected this outlook. However, the detailing of the log and log buildings, especially the corners of buildings, had a major role to play in this aspect. Here again, the traditional, long-ended corners were seen as undesirable, and various novel corner types, where the logs ended precisely at the corner, were seen in a more positive light. This was especially seen to be connected with the suitability of log houses among other types of buildings, and with the idea of modernity, or rather, contemporary architecture.

The size and shape of the bevel was also seen as important in using log in a contemporary manner. The non-traditional round bevel of the Timber Tetris pavilion was also mostly well received by participants. However, more minimalist-style bevels were also suggested by several participants. These would have been rectangular, not round and generally smaller. The overall reasoning here seemed to be that it whatever the bevel was, it needed to be different in order to send a message: this is a contemporary building.

Some participants also expressly viewed log as a material of the future. These perceptions had mostly to do with environmental factors and health factors, as well as the changing regulations in Finland. Participants were very much aware that wood is a renewable resource that can be harvested locally, and that log buildings have a reputation as 'healthy' buildings. Participants were also very much aware that in the past, regulations in cities had made it difficult to gain a building permit for log buildings, due to esthetic concerns and fire regulations. Of these, the fire regulations were still seen as impeding the building of larger scale wooden buildings, and most participants were waiting for these to be "updated" or "optimised", in their language. The esthetic concern, however, was seen as an impediment to small houses, for example single family homes; however, our planners and building permit officials recognised this as somewhat of a thing of the past. Most were ardently of the opinion that log could be used in an aesthetically pleasing manner.

Predominantly rural, but potential for urbanity

Our participants were unanimous in their opinion that log is very much a rural building material and does not automatically suit urban settings. Only some participants alluded to the fact that up until the 20th century, Finnish cities had been mostly made of log buildings, albeit often covered with wood panel siding and other details to emulate classical stone buildings.

However, participants also acknowledged that the confinement of log into rural settings was undergoing some changes. Among these participants, the current preoccupation with log can be argued to revolve a great deal around what we might term the "urban question": Can log be an urban material? Overall, while participants viewed log as a material with a strong rural identity, most were of the opinion that this was a matter of how the material was employed architecturally. According to our participants, this hinged yet again mostly on the detailing of the corners. The traditional Finnish style corner, the so-called long corner (*pitkänurkka*), was unanimously considered to be unsuitable to urban settings. The traditional Finnish short corner (*lohenpyrstönurkka*) and variations of it were deemed more desirable. One senior designer remarked that he liked the fact this style of corner enabled the viewer to see that the wall was, indeed, massive wood.

For our designer participants overall, an important aspect of the corner was pure novelty. Many remarked positively on the specially designed corner of the Timber Tetris pavilion, stating that it was nice that it was not totally traditional. Overall, the whole discussion among the architects (students, officials and designers) can be seen as being heavily rooted in the architectural desire of using materials in what is described as an "honest manner" (which could be described in contemporary terms as "what you see is what you get") and a demand for novelty or avant-garde. From the point of view of the Finnish log industry, this urban question has also resulted in novelty, a new type of corner, the so-called zero corner. Unlike the traditional short corner, the zero corner conceals the ends of the log completely.

It could also be remarked here that Western urban culture itself might be characterised as having a sort of pull towards the avant-garde. Urban centers are seen as hotbeds of innovation (e.g. Hall, 1998; Florida, 2005; Glaeser, 2011). This might affect the image of log, as well. Novel designs might be more readily accepted as urban, despite what the actual design is like. Similarly, the

architectural trend towards homogeneity, to which we alluded previously, will likely serve to dissipate the rural image of log.

Purity and non-purity

One word that appeared often in our participants' comments was "pure". While pureness or purity was always expressed as a desirable aspect, this word, however, seemed to have varying and distinct meanings in relation to log as a material.

Firstly, pureness was used quite obviously in the microbial sense of the word, referring to hygienic purity. In this sense, log was alluded to in a mostly positive light. Log was seen as a healthy, pure material due to its naturalness. Another factor was the massiveness and simplicity of log construction. As a massive structure, log was seen to avoid many of the moisture problems of layered structures, and this was deemed also reassuring, as it is easy to understand for professionals and non-professionals alike. Participants also cited studies wherein indoor air quality was improved through the use of log in comparison to other materials. However, a couple of participants were hesitant to consider log as a suitable material in hospitals, alluding to hygienic issues. Thus, for our participants, log was simultaneously a pure and impure material, depending on the use context.

However, there was a more complex aspect of purity that emerged in the materials as well. While all participants regarded log and wood in general as a beautiful material, some remarked that they might not want to see too much of it in interior spaces, because this was not "visually pure", as stated by some participants. Furthermore, this lack of visual cleanliness was associated with summer cottages. In these leisure homes, this visual (im)pureness was suddenly tolerated, and deemed appropriate. While we can naturally argue that log has some properties, such as knots and bevels, that indeed make the material more visually busy (and thus, in the modernist sense, less pure), this does not fully explain the situation, since this busyness is tolerated elsewhere, and moreover, in a place of rest, the summer cottage so beloved by Finns. We argue that this finding could be explained through Mary Douglas' argument on cultural purity. Douglas argued that the concept of dirt and impurity, as used in everyday life, does not refer only to microbial excess, but to cultural categories: More often things that are seen as being impure are simply *matters that are in a wrong place*. Thus, cleaning is a method of organising our world. As one of our participants self-reflectively stated many times "I guess I just want things to be in clear categories" (O1). When anything transgresses current cultural boundaries, this becomes closely connected with the idea of dirtiness and undesirability. This process works subtly in the background of our daily life. Things which do not align with our pre-existing categories can, in some cases, be considered even disgusting, morally corrupt, or even dangerous. (Douglas, 1966) Indeed, the modernist preoccupation with visual cleanliness does suggest that ornate features in architecture are a threat to occupants' health.

From the point of view of log, then, this results in subtle tensions: we found the association between log and rural and leisure settings to be very strong for our participants, despite the fact that they were professionals, and knowledgeable about the changes that the material was undergoing technically and architecturally. Thus, there is a continual and distinct threat that log, described by participants as inherently natural, healthy, trustworthy and beautiful, becomes very undesirable when it is "out of place". These findings, interpreted through the concept of cultural purity, can help us better understand the situation in which log as a building material is currently. While many feel that its use is beneficial and desirable, we do not want to see it in categorically "wrong places"; unless it goes through a transformation of some sort, it becomes culturally impure, especially visually, as both a facade material as well as an indoor material. Thus, log has an uneasy relationship with various building types. This explains why log as a material must undergo an alteration (most

often through novel details that are non-traditional) before it can retain its status as an appealing and healthy material.

Natural and industrial at the same time

When first inquired about their perceptions of log, most participants described the material as natural, massive and even as having an element of craftsmanship about it. This was deemed very important; indeed, it seemed to be the most alluring quality of log for our participants. With some participants, ecological aspects also played into this idea of log as a material that is somehow close to nature.

However, when discussed in more detail, participants were very much aware that lamella logs are not just pure wood, but also contain adhesives. Here, the industry representatives and architects differed greatly in their opinions of what this means for log. While industry representatives considered the stability and preciseness of lamella log as a crucial advantage, they were remarkably, albeit understandably, quiet about any concerns that the adhesives may cause. However, the officials, design practitioners and students, who were all architecturally educated, mostly felt that while the lamella log otherwise was a definitive improvement, the adhesives they contained were definitely not a positive feature overall. Something of the 'realness' and 'naturalness' that made log desirable in the first place had been lost, and several participants went on at length about this conundrum.

However, it was not totally unacceptable for our architect participants that logs are industrially processed. Indeed, the novel opportunities excited them. When queried whether the Timber Tetris pavilion was 'real log', almost all were sure in their opinion that the material was indeed 'real log' to them. It would seem that since 'naturalness' is a difficult concept that is hard to justify, lamella logs sit at the edge of the categories of natural and artificial, resulting in a kind of compromise that was, on the whole, acceptable, if not desirable. Thus, log seemed to be both a low-tech and a high-tech product at the same time.

Discussion and conclusions

In the following, then, we will discuss our findings further, in the light of our literature review.

Log is a material that is mired in deep contradictions

Overall, it would seem that log is a material that is, at least currently, mired in deep contradictions. As we analysed in our participant materials, log is seen simultaneously as a traditional material, but also as a contemporary material, owing to current trends in international architecture, ecology and environmentalism, and occupant health. Similarly, it is seen as both pure and impure hygienically and culturally; its use is limited and controlled by a large number of notions in both regards. Finally, it is both industrial and natural, making it a low-tech and high-tech material. No wonder most of our participants outside of the log industry had never used log professionally.

An ideal log product, then, would retain the natural, or even handcrafted feel of the pre-industrial log and combine it with the ease and predictability of the non-settling lamella log. For these ends, the adhesives should be replaced with another method of combining crisscrossing lamellas into a log, most likely a mechanical one. Based on our participants' views, solving the conflict between the natural and the industrial could increase the desire to use log as a building material among professionals. Such a product would be malleable and exact enough to transcend the traditional detailing associated with log construction.

Images associated with log building are very strong

A second finding we would like to highlight is the fact that the images associated with log and log building were very strong indeed for our participants. This empirical finding is quite understandable when seen through the historical and cultural context of log in Finland that we briefly summarised earlier. Our participants' statements reflected this past, and we could even say

that in prior decades, log in Finland has been a material stigmatized as an undesirable, overly traditional material of limited architectural potential. Similarly, buildings made out of log were seen as un-modern and not suitable outside of leisure time circumstances.

While the traditional-ness of log seems to be changing into a positive feature, the summer cottage connotation seems to persist in a problematic manner. The implication for design and product design here, is that log must undergo a further transformation. The desirability of log, then, seems to depend on more high-status contemporary design, achieved through novel architectural uses and use cases. However, an interesting question we might pose for architects here is whether or not some traditional details could be successfully integrated into urban environments, and if so, under what conditions?

Log as material is undergoing a rapid change in perceptions

The changes that are currently affecting log appear to run the gamut of what is possible. Some of these changes are technological in nature: the introduction of industrial log and computer-controlled manufacturing methods, which are changing the nature of log itself. These result in architectural questions of what can be done with this new material. Some questions are regulatory in nature: where are the limits of using log in urban settings, especially vertically? Finally, all this affects and is affected by what we culturally think log is, and what it should be. Culture plays a major part in what is happening around log as a material; the surging interest in the ecological aspects of wood changes our perceptions of log, as was also seen in our materials.

A central question that still arises from this material is, whether or not the use of lamella log is still relevant in the age of CLT and its glue-free alternatives? This line of questioning was not pursued directly in our interview, and, as such, it would warrant further research. However, on the basis of the materials at hand, we can argue that the very nature of lamella log is different from CLT, despite the physical sameness of the material. This is due to the fact that for our participants, 'log-ness', and everything that was culturally related to it, was most definitely a combination of *material*, *shape* and *use-context*: a long, horizontal piece of massive wood, stacked on top of each other. Log, then, is a cultural assemblage, and not a mere raw material. Since log is defined by at least three parameters, the addition of adhesives into this assemblage does manage to render it somewhat unstable, but not unrecognizable – lamella log was still log to the participants.

Log, then, is still relevant in the cultural contexts that it has been found. The crucial factor, then, is whether or not log is desirable to professionals and their customers. From this point of view, a better future could well be in store for log as a material: Our analysis did suggest that there may be differences between the generations of professionals in their relationship to log as a material. Although we cannot ascertain this through our current study, this would make a fascinating research question for further investigations. While the senior architects were more hesitant and had a somewhat distant relationship to log, the student participants we interviewed were definitely very curious about the material, especially due to its ecological and health-related benefits. However, the students' knowledgeability concerning log and log construction varied considerably. It would seem that the architectural education system did not expressly teach them about the subject; rather, the matter was left for them to explore on their own.

Future (for) log buildings

As one of our participants expressed, "log has unused potential". This potential relates to ecological issues, health issues, log as a business commodity, as well as architectural expression. Our research at this point manages to scrape the surface of what is possible with and for log as a building material. In the future, more studies should conducted from various points of view. Some of these would include a better integration of the general wood literature with the much smaller log literature, and a discussion of what those findings might mean for

log research. Secondly, several multi-pronged studies on log should be conducted; for example, some relevant questions might include how the extra cost of the material could be offset by either architectural design strategies or by business measures.

At this point, it seems quite certain that if the glue were to be removed from lamella logs and replaced with, e.g. mechanical fastening methods, a sweet spot might be achieved where the material integrity of log would not be compromised while a technically contemporary and architecturally desirable product would be created. Even more so than the material, then, shape was a crucial factor in establishing both the log-ness of the material. Thus, much attention should be placed on the form factor of log. The thickness and shape of the bevels, as well as the design of the corners were clear and powerful cultural signals to our participants. It could almost be said that the most important factor about these details was the newness of the design. In regards to the bevel, the smaller it was, the better is seemed to fare with our participants. This raises the questions, should there be a zero-bevel log? Architecturally, this would certainly open up new ways to use log. However, it remains an open question whether this would have finally changed the essence of log enough that our participants would have said “This is no longer log”. Thus, the question of the bevel remains an object for further inquiry.

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