

Embodied reasoning in architectural critique

Keith M. Murphy, Department of Anthropology, University of California, Irvine, USA

Jonas Ivarsson and Gustav Lymer, Department of Education, Communication and Learning, University of Gothenburg, Sweden

In this paper we explore the use of analogical reasoning as a means for identifying problems in architectural critique interactions. We focus in particular on the conversational invocation of specific architectural references as comparative cases intended to expand, clarify, or challenge details in student presentations. These analogical comparisons are not merely asserted by critics, but are interactively achieved as multimodal forms of action that combine talk with other forms of embodied action. Moreover, taking into account the wider goal structures in which the comparisons are embedded, we argue that in the context of architectural education, reasoning through analogy is a key means for socializing students into certain aspects of professional architecture and testing the limits of architectural knowledge.

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In this paper we explore the use of analogical reasoning as means for identifying problems in naturally-occurring architectural critique interactions, or 'crits.' Drawing from discourse analytic and ethnomethodological analytical frameworks we focus in particular on the conversational invocation of specific existing architectural references as comparative cases intended to expand, clarify, or challenge details in student presentations. As we will show, these analogical comparisons are not merely asserted by critics, but are interactively achieved as multimodal forms of action that combine talk with other forms of embodied action in order to work. We argue that these reasoning practices are highly visual, rather than primarily linguistic, activities, and as such draw from a range of different semiotic and pragmatic resources. For example, talk, gestures, and drawings. Moreover, taking into account the wider goal structures in which the comparisons are embedded, we argue that in the context of architectural education, reasoning through analogy is a key means for socializing students into certain aspects of professional architecture and modeling the application of relevant architectural knowledge.

Corresponding author:
Keith M. Murphy
kmmurphy@uci.edu

We examine several examples in which critics utilize analogical reasoning for ‘seeing’ design details in particular ways and offering possible frames for understanding those details as somehow problematic. Such reasoning practices afford opportunities to discuss different types of issues that architects face in their professional practice and, more generally, in their ‘designerly ways of knowing’ (Cross, 2006). While such practices are generally centered on verbal descriptions, they often also exhibit a strong embodied component in which the use of gestures and other body movements are used to explicitly connect features of a particular reference to the student’s design as it is presented on posters or slides or models. Thus in order to establish a working connection between student work and an existing reference, the comparison cannot simply be a matter of sequential arrangement of source and target (though the sequential patterning matters), but must also rely on detailed embodied actions that publicly link features of the existing building to features of the design under scrutiny.

In contrast to much of the literature on analogy and reasoning in design, we draw our analysis from the flows of naturally-occurring face-to-face interaction. Our approach parallels those that explore designing as it occurs in its ethnographic context (Ball & Ormerod, 2000; Bucciarelli, 1988; Hughes, O’Brien, Rodden, & Rouncefield, 2000; Lloyd & Deasley, 1998; Viller & Sommerville, 2000; Vinck, 2009; Yaneva, 2009), however we center our analysis within ethnomethodological and discourse analytic frameworks to help understand the meaningful and relevant work reasoning practices accomplish for critique participants themselves. In line with research that emphasizes the situated use of talk, embodied language, and material artifacts in the ongoing and interactive social enactment of architecture and other design disciplines (Fleming, 1998; Ivarsson, 2010; Luck, 2009, 2010; Lymer, 2009; Lymer, Ivarsson, & Lindwall, 2009; Murphy, 2004, 2005; Oak, 2011; Reid & Reed, 2007), we concentrate on how analogic comparisons are constructed by critics, potentially taken up by students, and contribute to the real-time establishment of architectural knowledge and practice. One of our central aims is to contribute to existing studies of critique in architectural education (Dannels, 2005; Dannels & Martin, 2008; Frederickson, 1990; Jones, 1996; Webster, 2005, 2006, 2007) by focusing on the ways in which pedagogical moments are constructed in social interaction through a complex blending of talk, embodied action, and different visual forms.

We start by discussing the general role of reasoning in architecture and design interactions. We then turn to an elaboration of *mundane reason*, the most prominent form that reasoning takes in both everyday life and architectural critique, focusing in particular on drawing comparisons through a kind of analogic process called *abduction*. Finally we analyze several cases in which critics use abduction to connect student work to existing architectural references before discussing the implications of this work more broadly.

1 Reasoning in architectural critique

Critique sessions are a central aspect of architectural education (Dannels, 2005; Vowels, 2000; Webster, 2005), and constitute perhaps the most significant element of standard design studio pedagogy. After working on an assignment for some amount of time — it usually varies from assignment to assignment — students are required to present their finished projects, typically in the form of drawings, models and slideshows (Lymer et al., 2009), and receive feedback from an audience made up of professors, fellow students, and practicing architects. In several respects this general process mirrors practices that students will engage in once they leave school, thus functioning as preliminary training for their future working lives. For instance, successfully communicating a design proposal to an audience of diverse professionals and handling possible negative evaluations are important skills for an architect to master. However in other important respects critique sessions are quite different from presentations made by professional architects, most obviously in that student work is not intended to be transformed into real-world structures. Overall design reviews are a central activity for the articulation, teaching, and learning of various architectural competencies, including architectural knowledge — both the kind one needs to do architecture (e.g. mechanics, materials, standards), and the kind one needs to understand it (e.g. design history, theory, architectural references) — as well as specific practices necessary for working as an architect. In other words, the critique session is a primary site for socializing students into the world of architecture as professional practice.

As in other domains of architecture, critique sessions are in many ways structured as a series of interlocking reasoning processes. Initial presentations usually involve persuasive and rhetorical components in which students attempt to convince the audience that their design proposal is an ideal solution by reasoning through the choices they have made and highlighting the project's strongest points. In response, critics — especially the professors and professional architects — will identify particular features of the design for further discussion and elaboration, often drawing out what they see as problems in need of fixing, or puzzles in need of solving. Walking through why a feature is problematic (or successful) from the critic's point of view requires a reasoned explanation that in general makes sense to both the critic and the student, and students are free to accept or counter the criticism with their own reasoned replies.

Reasoning has been studied extensively in various design contexts. Two influential and related areas of concentration have focused on the role played by reason in decision making in design (Almendra & Christiaans, 2009; Ball, Maskill, & Ormerod, 1998; Christiaans & Almendra, 2010; Demirkan, 1998; Tang, Aleti, Burge, & van Vliet, 2010) and in problem-solving in design

(Ball, Evans, Dennis, & Ormerod, 1997; Casakin, 2007; Casakin & Miller, 2008; Van Daalen & Bots, 2010). While most such studies derive from the close examination of real-world designers engaged in actual design work, they tend to emphasize the cognitive and processual dimensions of designing over the situated sociocommunicative contexts in which designing occurs (cf. Luck & Ikeya, 2010).

The present study, in contrast, starts from the point of view that reasoning in architectural critiques is a consequential achievement embedded in the rich textures of social interaction. From this perspective reason is not simply a mental faculty governed by universal rules of logic. Instead, as we will show, reason operates as a conversational strategy, a technique for identifying and elaborating problems that stem from different interpretations of ‘the same thing’ in a student’s proposed design, and a way to link those things to other (professionally, technically, aesthetically) relevant phenomena. We draw from Donald Schön’s (1979) assertion that using metaphorical reasoning is a way to see a thing as something else, and focus in particular on how critics engage in reasoning practices to publicly and interactively ‘construct what is wrong and what needs fixing’ (Schön, 1979: 268) in student projects. The kind of seeing involved with this reasoning is not mere perception, however, but is more a kind of ‘professional vision’ (Goodwin, 1994), the socially organized ways in which the practice of seeing is structured and made relevant to the field of architecture (see Lymer, 2009). Critical to the concept of professional vision, and its relation to situated reasoning, is a recognition that seeing as a social practice cannot be separated from the material worlds in which speakers are embedded, the bodily actions that channel attention and enhance meaning in interaction, and the epistemological infrastructures that underlie professional activities and goals. Moreover, the ways in which seeing is professionally organized and made relevant is critical to the very integrity of professional practice. Indeed, learning to see like an architect is an irreducible requirement for successfully doing architectural work. Understanding how spontaneous reasoning works in architectural critique sessions, then, requires paying close attention not only to the ways in which it is verbally and rhetorically expressed, but also how those expressions link up with specific aspects of the broader sphere of architecture — some concrete and visible (like specific buildings) and others abstract and invisible (like the meaning of ‘good architecture’) — that when presented in the context of architectural pedagogy can contribute to students’ becoming better architects.

2 Abduction as a form of mundane reason

Ethnomethodologists have identified a sort of puzzle that people often face in everyday life: how can differences in interpretation be resolved when individuals understand what seems to be ‘the same’ phenomenon in different, or even contradictory, ways? How is it that this disparity is rendered sensible and orderly, rather than troublesome and disruptive to the normative social order?

Melvin Pollner (1974, 1987) has called the techniques that we use for solving such puzzles and making sense of the world around us ‘mundane reasoning.’ Rather than engaging in complex, technical procedures of the sort that philosophers and logicians excel at, an ordinary reasoner relies on previous experiences to come up with ‘countless candidate possibilities for solving mundane puzzles’ (1974: 36), for making sense of phenomena that present as having multiple possible interpretations, and doing so in ways that seem relatively sensible to other people. Thus in order to make sense of why his boss did not say hello, a mundane reasoner, ‘assum[ing] a world which is not only objectively present but a world to which he has continued experiential access and, further, which others experience in more or less identical ways’ (Pollner, 1974: 35–36), might propose that the boss did not see him, or that she was mentally occupied with other thoughts, or maybe she was trying to ignore him. In other words, the mundane reasoner attempts to solve the puzzle of multiple meanings though the application of *relevant possibilities* gleaned from past experience with the social world to present circumstances. Mundane reason is thus ‘a background scheme of interpretation which provides the intelligible or accountable character of mundane inference and interpretation’ (Pollner, 1987: 19), relegating the bulk of everyday life to the realm of the taken-for-granted, while at the same time offering resources for explaining circumstances that deviate from normative expectations.

From the traditional point of view of formal logic, reasoning typically proceeds through either induction or deduction. Inductive reasoning posits that a conclusion *can* follow from original premises, but it is not *necessitated* by those premises. Thus, for example, when presented with the claims that ‘steel is a strong building material’ and ‘bridges must support a large amount of weight,’ it certainly follows that ‘bridges constructed with steel are strong enough to support a large amount of weight,’ but that conclusion is not unambiguously true in all circumstances. The particulars of the initial premises may lead to a reasonable conclusion, but they do not determine it. Deductive reasoning, in contrast, *requires* that conclusions follow from original premises. Thus the classic syllogism ‘all men are mortal’ and ‘Socrates is a man’ necessitates the conclusion that ‘Socrates is mortal,’ leaving no logical wiggle room for alternative formulations.

While mundane reasoning may involve inductive or deductive processes, it more often relies on what Charles Sanders Peirce (1955) calls *abduction*. Abduction is primarily grounded in the use of analogy, by which certain features of some target are treated as at least contingently comparable to those of another. In contrast with inductive and deductive reasoning, the movement from premises to conclusion in abduction is not necessarily guided by formal logical connections, but instead involves a looser kind of method. It generally begins with the observation of a set of circumstances in one context, followed by a reflection on or recognition of other phenomena whose features, sometimes abstract and

sometimes concrete, plausibly match those of the case under consideration. For Peirce abduction essentially operates as a hypothesis, as a ‘proposition added to observed facts, tending to make them applicable in any way to other circumstances than those under which they were observed’ (Peirce, 1955: 151). In other words, Peirce conceived of abduction as a sort of test-based reasoning, a way to press some given features of the world against others in order to verify their similarity, and their possible deeper correspondence.¹

An example of this might be comparing a school to a prison. While there are some specific and obvious qualities of a school that may minimally parallel those of a prison — perhaps its architecture, or uniforms worn by students, or long cafeteria queues — there are also many differences between the two institutions. Nonetheless, as Peirce noted, ‘where we find that in certain respects two objects have a strong resemblance, [we can] infer that they resemble one another strongly in other respects’ (Peirce, CP 2.624), even if the resemblance is not symmetrical in all instances. Thus the power of the comparison of a school to a prison derives not only from the alignment of specific qualities, but also from the general abstract sense evoked by an image of a prison that descriptively projects onto, and thus amounts to an explanation of, the school itself.

Deborah Tannen (2010) has used the concept of abduction to explain the phenomenon of ‘ventriloquizing’ in interaction — that is, when speakers ‘borrow identities by taking on, temporarily, characteristics associated with those they voice’ (Tannen, 2010: 310), usually for some intended effect (for example, speaking with a comical and exaggerated ‘dog’ voice to attribute human agency to an otherwise voiceless pet). She draws from Gregory Bateson’s (1979: 153) characterization of abduction as the ‘lateral extension of abstract components of description,’ which Bateson sees as fundamentally embedded in a range of human phenomena, including ‘[m]etaphor, dream, parable, allegory, the whole of art, the whole of science, [and] the whole of religion’ (Gregory Batesons, 1979: 153). More specifically in the context of design, Jon Kolko (2010) has recently identified abductive thinking as a critical mechanism for organizing information and driving synthesis in the design process, while Ball and Christensen (2009), Casakin and Goldschmidt (2000) and Hernan Casakin (2006a, 2006b, 2007) have studied the use of metaphor and analogy, two forms of abductive reasoning, as significant techniques for solving particularly vexing design problems.

3 Mundane reasoning in architectural interaction

In examining abduction as the mechanism of mundane reasoning in architectural critique sessions we are breaking away from previous research on analogical reasoning in design along at least two dimensions. The first is the particular design context under investigation. While formal design crits have received some attention from several analytic perspectives (Anthony, 1987; Dannels, 2005; Gaffney, 2011; Jones, 1996; LeBaron & Streeck, 2000; Lymer, 2009;

Lymer et al., 2009; Wilkin, 2000), most studies of designing in action, including those focused on reasoning, have centered on the more informal kinds of day-to-day work, both educational and professional, that takes place in the studio. To be sure, the boundaries between formal and informal work in the studio are not always clear, especially in relation to the modes of critique, as students are typically engaged in constant discussions with both peers and professors. Nonetheless, the design work accomplished during organized and scheduled critique sessions is a recognizable — and recognizably bounded — aspect of design education in need of further investigation.

The second dimension along which we deviate from previous research is the method we are using to study analogical reasoning and design. Our central focus is naturally-occurring reasoning in situated and consequential social settings. We proceed from the premise that the use of particular reason-structures at particular points in time serves some context-relevant purpose. By way of contrast, Casakin (2006a, 2006b, 2007), for instance, has constructed studies of metaphor in design by treating the studio as a sort of laboratory, and architecture students as experimental subjects. Students are given tasks that explicitly require them to use metaphors as part of their process, and statistical analyses are conducted based on questionnaires filled out upon completion of the assignment. In many of these projects the metaphors studied are applied at the highest conceptual levels and serve as guiding principles motivating the progression of the design, for example, redesigning a specific pathway in a city through the metaphor of the ‘village fountain’ (Casakin, 2006a, 2006b). The kinds of abductive reasoning we are examining, however, are deployed spontaneously and on an *ad hoc* basis, functioning more as conversational strategies that illuminate specific elements of a design rather than the entirety of the design itself. Moreover, in their situated use they tend to operate less as forms of problem solving, though problem solving is often also involved, and more as a means of what Schön (1979) calls ‘problem setting,’ establishing the parameters by which a problem is itself formulated from raw facts. In other words, in the context of architectural critique, abduction figures prominently in the interactive establishment of a problem framework, and it is this framework that then allows the student to see the problems in their design, connect them to a broader body of architectural knowledge, and subsequently work to solve them.

4 Crits, critics, and critique

In general the review session consists of two phases. First, a student will spend 5–10 min presenting her proposal, which she has been working on over the previous several weeks. She describes the project and its rationale, typically referring to the drawings (plans and elevations) that are hung on partitions or walls, as well as the scale models kept on the floor below. After the student has finished presenting her proposal, the discussion phase begins, in which critics offer critiques of the student’s design and presentation. Generally the

review functions both as an assessment of the presented work and as a learning opportunity for the participating students, including those watching in the audience (Wilkin, 2000). Over the course of the entire program students undergo several formal reviews of their own work, and given that they also participate in their peers' review sessions, this practice becomes a central and recurring component of their educational experience.

Critics attempt to accomplish many things in their critiques. The idea is not to point out only the things that are wrong with a student's work. They will also push the student to explain her designs more clearly or thoroughly, prodding her to reveal the thought process that has led to the final outcome she has presented. Critics also tend to spend a good deal of time praising the student's work, highlighting particularly inspired design solutions or aesthetic choices. They will also often reanimate some feature of a student's design, casting the work in a different context from what the student has presented by re-describing details in new historical or conceptual terms.

However the most salient and resonant component of the critique is, for many students, the identification of problematic elements of their drawings and presentation. While negative critique is institutionally recognized and promoted as a necessary component of architectural education, it nonetheless often takes on some of the characteristics of *bad news*, which is often received in mundane situations as an 'assault on the ordinary, typical, predictable, moral world of everyday life' (Maynard, 1996: 110). In ordinary conversation bad news is rarely delivered without explanation. Because it is so disruptive of the natural and expected moral order, speakers typically engage in mitigating actions that frame the bad news in somewhat more palatable ways. In ordinary conversation utterances that break from taken-for-granted expectations generally require some sort of *account* that meaningfully explains the deviation (Buttny, 1993; Garfinkel, 1967; Heritage, 1984), providing 'a running index of action and interaction' (Heritage, 1988: 128) that renders the deviation sensible, and indeed this is also true in architectural critiques. When critics identify a feature of a student's design as problematic, they cannot simply let the bad news stand, but must offer an account for the negative assessment, especially given that the student has probably treated the targeted feature as unproblematic.

Compared with everyday conversations, however, bad news is morally positioned somewhat differently in architectural critique. In contrast to ordinary circumstances (Maynard, 1996, 1997), the 'bad news' component of the critique is rarely forecast as it is in ordinary conversation. Indeed, within the frame of the critique bad news is in many ways the *expected and predictable formulation of an evaluation*, and a lack of some negative assessment would itself stand out more prominently as a kind of 'assault.' While negative assessments in critique sessions are indeed followed by accounting practices that serve to mitigate the bad news aspect of the evaluation, these accounts, crucially, also

provide critics opportunities to introduce new and pertinent information into the evaluation. Indeed, within this context, the negative valence of an assessment is not treated by critics as deriving from their personal preferences, but rather from factors associated with a design's 'objective' feasibility. By formulating their assessments as accounts critics are able to transform what might otherwise be read as straightforward negative evaluations into professional explanations rendered in architectural terms. In other words, the accounts that follow negative assessments are not simply mitigations in the sense of downplaying the seriousness of the critique, but rather constitute the actual substance of architectural critique.

More specifically, we are arguing that abductive reasoning in architectural critiques functions as one of the central accounting mechanisms that critics use for justifying their assessments of student work and embedding their justifications within specific knowledge structures relevant to the profession of architecture. As we show below, by using abductive reasoning to compare students' work to particular architectural references, critics offer institutionally authoritative explanations for *why* a feature of their work is problematic, while simultaneously indexing specific institutionally relevant cases through which architectural reasoning ideally proceeds. Moreover, reasoning in this way is not simply a mental act in a narrowly cognitivist sense, but unfolds in interaction as an embodied practice 'directed toward, answerable to, and realizable as physically definite action' (Livingston, 2006: 423). In other words, understanding how reasoning 'works' in architectural critiques requires close attention to the social, professional, material, and communicative contexts in which reason is realized and purposefully deployed.

5 *Analysis*



The cases we analyze here were recorded as part of a larger project investigating learning, interaction, and the use of technology in architectural education in Sweden (Ivarsson et al., 2009; Lindwall et al., 2008; Lymer, 2009, 2010). In total 143 architectural design review sessions were captured during the study, each ranging from 15 min to 1 h, totaling approximately 70 h of video. The particular examples we are using, all recorded over two consecutive days, come from the final component of a course offered as part of an international master's program in architecture in the city of Gothenburg. The students' assignment was to design a hotel for a small lot that currently sits empty on a narrow and busy shopping street in a popular part of town. Because many of the students did not speak Swedish natively, instruction for this course was carried out in English, which all of the participants spoke fluently.

Critical to the application of abductive reasoning in architectural contexts — and often in other mundane and professional contexts, as well — are the ways in which specific kinds of verbal language are used along with embodied actions to link student work to an architectural reference in a publicly visible

way. Take the following example, in which Sten, one of the course's instructors, is discussing the work of a student named Bill, whose Z-shaped hotel plan creates oddly shaped inner rooms and corridors, something that several of the critics have previously pointed out. He begins by identifying a problem in Bill's overall design as a conflict 'between order and complexity' (lines 1.1–1.7).

- 1.1 Sten I think it might have something to do with the relation between
 1.2 order and complexity and and and there is a bit too much
 1.3 complexity to solve the practical, functional problems here.
 1.4 Bill yeah.
 1.5 Sten and a bit too little order I think.
 [lines omitted]
 1.6 Sten the complexity can be much, e:h, clearer, or much more visible
 1.7 if you::, balance it, against an order.
 1.8 Bill yeah.

Once Sten has identified the problem in Bill's project, another critic named Tom, an external professional architect, invokes a building in Denmark, designed by the firm PLOT, as what he calls an 'interesting reference' (line 1.9). In PLOT's building, called VM Hus, every apartment has a unique plan, and many of them contain irregularly shaped rooms, as do those in Bill's hotel. Yet even before Tom specifies his reference, he begins twisting his flattened hands, palms facing each other a few centimeters apart, back and forth in opposite directions as a way to visually depict differently ordered rooms (line 1.10).

- 1.9 Tom I think e:h, an interesting eh, an interesting reference eh, of
 1.10 how to- how to solve these different angles

 twists palms back and forth, at opposite angles
 1.11 is the- the Plot's- Plot's VM- VM Hus.

 holds one hand over the other
 1.12 Bill m:hm.

Continuing with his reference, Tom then thrusts his hands forward, one above the other and positioned at angles in a sort of stacking motion, as a way to represent the solution that PLOT used for the irregular corridors produced by their complex plan. He moves his hand away from his body as he describes the idea that some corridors extend all the way to the facade (line 1.14), and then moves his hand back toward his body when describing those that do not — while at the same time Bill, the student, is looking at his own scale model, which sits on the floor in front of them (line 1.14).

1.13 Tom e:h, how they, work with the different corridors, and let them



thrusts left hand, then right, then left, at angles

1.14 go to the facade on one level, but not in the next and so on.



right hand curves away from left, then back

1.15 and how these different--

1.16 how they work with the communication--

1.17 Bill m:hm.

1.18 Tom --between those, those different flats.

1.19 Bill m: I'm a bit (1.0) this project has been an opportunity to try,

1.20 you know, everything.

Tom has thus not simply offered a verbal comparison of Bill's project to VM Hus, but has also given a quick visual representation of the precise features that he sees as abductively relating to Bill's hotel, and it is this embodied specification that interactively holds the comparison together. Bill's project is similar to PLOT's in only minimal ways; the two are differently programmed (one is a hotel and the other an apartment building), are designed at very different scales, and the rooms under comparison are structured nothing alike. Nonetheless Tom's use of the VM Hus in his evaluation, sequentially positioned immediately after Sten's establishment of 'order and complexity' as a problem framework, can be read as a possible 'solution' to the identified problem, presumably because PLOT faced a similar problem of balancing a complex and ambitious formal design with the need for order and stability. This connection is, to be sure, rather abstract, and Tom justifies his invocation by focusing on the fact that rooms and corridors in both projects contain complicated angles, a similarity he demonstrates with a series of gestures. In so doing he provides a visible description for Bill (and the audience) of a building that otherwise has no immediately visual counterpart to Bill's drawings and model. Moreover, Bill first watches Tom as he makes his demonstration, but then shifts his eye gaze to his own scale model as Tom continues his comparison, in effect laminating Tom's description of the VM Hus onto the immediate perception of his own design, thereby rendering the abductive connection between the two projects not simply logically consonant but also immediately resonant in direct experience.

In the next example, a student named Sue has just completed her presentation, and Jon, one of the course instructors, begins detailing a problem that he suggests Sue will face with regard to the balconies she has designed for the hotel. After rising from his seat he moves directly over to stand in front of Sue's drawings, which are mounted on partitions in front of the audience. With

his right index finger he selects one particular drawing for attention, a building section that highlights the structural information of the balconies and the exterior wall. He first identifies the problem area by explicitly pointing to it and tracing the contours of the balcony on the building section (line 2.1), and throughout the rest of this assessment Jon keeps his hand placed on or near the drawing. He then proceeds to explain that the balconies are a problem as Sue has designed them because of the Swedish climate (lines 2.2–2.5).

2.1 Jon the difficulty of having the wall popping in and out.



traces along exterior wall and balconies

2.2 not a problem in Spain or in California (.)

2.3 Sue no.

2.4 Jon a problem in Sweden where you get the water

2.5 and snow and so forth in.

Jon then claims that the design choice Sue has made will require that ‘you have to build a bit of roof,’ simultaneously placing his thumb against the balcony and running it slowly back and forth along its edge (lines 2.6–2.7), indicating where in Sue’s scheme the extra roof section would need to be built. This produces ‘a difference in height,’ he continues, between the floor of the apartment and the floor of the balcony, a distance he demonstrates with his hands (line 2.8).

2.6 and eh the principle what what occurs in a situation like this (.)

2.7 is that you have- you have to build a bit of roof at this point



carefully traces balcony floor

2.8 which usually ends up in- in a difference of height.



mimics a height difference

2.9 that you’re in the room, and you have to take a step or two up

2.10 to go out to the roof terrace (.)

Note that Jon prepares for his use of analogic references with the phrases ‘what occurs in a situation like this’ (line 2.6) and ‘usually’ (line 2.8), formulations that imply knowledge of a set of similar situations, what kinds of things occur in those situations, and relevant consequences for a design. Having

verbally and visually identified the balconies as problematic and provided an embodied representation of one of the consequences of this design, Jon then invokes two specific projects that faced problems similar to Sue's, one in Copenhagen (line 2.15) and the other in Stockholm (line 2.19). As he describes the two projects Jon keeps his pen or his finger directly on, or hovering near, Sue's drawing, an example of what [Goodwin \(2007\)](#) calls an 'environmentally coupled gesture,' a body motion whose meaning can only be decoded with reference to the material world in which it is embedded. This is a more direct and tactile instance of what occurred in the previous example, the interactive lamination of verbal comparisons onto the student's own work which visually links the two projects together. This continues in more detail with the second specific reference Jon offers, whose architects, Wingårdhs, solved the identified problem by staggering the balconies to provide a balance between sunlight and weather protection, which Jon describes while moving his hand successively down the column of balconies on Sue's drawing (lines 2.19–2.21).

2.11 this is quite possible to solve (.) but it's a matter of economy

2.12 and price of course.



points to balcony

2.13 Sue m.:

2.14 Jon and you will see it in some very nice housing projects (.)



circles balcony

2.15 C.F. Møller did one in Copenhagen--



points to balcony

2.16 Sue m.:

2.17 Jon --in the last year

2.18 Sue m.:

2.19 Jon Wingårdhs are doing a project in Hammarby Sjöstad at the

2.20 moment working with eh balconies (.)

circles, then points to balconies

2.21 every second floor in the corner (.)



points to floors in succession

2.22 Sue m.:

2.23 Jon and it's a very nice appearance in the facade.

2.24 but there is the technical complications, and you will meet

2.25 protest from the builders who have to do it (.) have to solve it.

circles, then points to balcony

2.26 Sue yes.

As soon as Jon has completed his assessment of Sue's work he breaks eye contact with Sue, his hand falls to his side, and he moves to take his seat once again. Thus in this relatively short sequence Jon has singled out the balconies that Sue has designed and identified their main drawback, their inappropriateness for weather conditions specific to Scandinavia. Using abductive reasoning he accounts for this assessment by invoking two buildings in major Scandinavian cities that suffer the same weather threat and share what he considers to be features similar to what Sue has drawn. The implication is that Sue should use these buildings as useful models for solving the Scandinavian balcony problem. Moreover, Jon does not simply assert the comparison, but actively demonstrates it by using his hand to carefully and continuously highlight (Goodwin, 1994) the specific details under consideration on Sue's poster, and then using those same details to animate his description of the Stockholm building in particular. This has the effect of pulling the two compared projects closer together for the audience, actively rendering disparate projects instances of *the same thing*, at least temporarily.

In the next example, Jon has just explained to Eve why her project faces some challenges both in terms of how the front of her building interacts with the street, and how some interior rooms interact with one another. After making these points he then immediately switches to a further problematic feature, the way Eve has drawn her hotel's bottom floor, a feature that Jon highlights by running his fingers along the bottom of the elevation (lines 3.3–3.4). The problem, as he articulates it, is that the building's courtyard is not open to the street, but hidden behind a 'closed facade.'

3.1 Jon there is also, when I see the facade

3.2 I think you have a- a- (.)



points to facade

3.3 you lost a potential for the courtyard, with this-

3.4 with this very closed eh, facade, which we know,

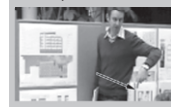


traces back and forth
over bottom floor

Jon then initiates a comparison by invoking not a building in a different city, but one just outside the university campus. In contrast to previous examples,

the invocation of this buildings presumes a certain kind of embodied knowledge, a recognition of the reference — as well as the specific problem — through direct experience. Jon primes his reference with the phrase ‘which we know very well, when you walk down to Landala Torg’ (the part of town where the building is located), which he enhances with a ‘path’ gesture representing the walk to Landala Torg (lines 3.4–3.5). He then specifies the experience even further, describing it as a movement ‘past Lars Ågren’s big buildings’ while pointing outside of the immediate interactional space toward what is the actual physical location of his reference. He then moves back to Eve’s poster and uses her elevation to describe Lars Ågren’s building, which also contains a closed facade on the ground floor, by tracing the bottom floor on Eve’s drawing while uttering, ‘when you have the totally closed bottom floor just like this’ (line 3.7).

3.5 very well, when you- when you walk down to Landala (.) torg,



traces path in air

3.6 past Lars Ågren’s big buildings,



points out of immediate space

3.7 when you have the totally closed (.) bottom floor just like this.



traces over bottom floor

3.8 and it’s-- there would absolutely be a potential

3.9 in first creating this big space outside the building,



‘C’ point to plan

3.10 and then not using it with eh- with um, contact be- to what’s

3.11 what’s inside.

As in the previous examples, Jon has used abductive reasoning to link the student’s project to a specific architectural reference as way to clarify why a particular feature is problematic. However the reference functions differently here because the critic appeals to the student’s personal experience of the building to justify the validity of his negative assessment. Jon does use

gestures to visually represent an aspect of the referenced building and link it to the student's work, as in the other examples, and by invoking an image of a closed bottom floor of the Lars Ågren building and then using the student's drawing to animate it, he physically links his reference to the exact feature he has identified as problematic. Because of its proximity to the university, and because of how Jon presents it, this reference serves as what Goodwin (2003: 323) calls a 'local metric,' an element of the natural surround that serves as proxy referent in story narration.² By actively pointing beyond the immediate interactional space to the Lars Ågren building itself Jon is able to lodge his reference in the familiar everyday world, a world which he, as a good mundane reasoner, presumes to share with the students. Indeed the very force of his reasoning that Eve's project is somehow 'like' his reference stems not from his authority as a professional architect, but rather from the assumed background schemes with which 'everyone' interprets the less desirable effects of certain architectural features.

In the final example the critic also relies on direct experience as a warrant for the validity of his critique. A student named Ann has just presented her hotel proposal. One of the most striking features of Ann's facade is a large, windowless wall facing the street, behind which, hidden from view, sits a restaurant at the back of a wide outdoor courtyard. Bob, an external professional critic, does not like this design because, as he points out, the restaurant and courtyard — which he sees as the best elements of Ann's design — are invisible to passersby. The main problem with this is that by hiding these features behind an imposing wall and through an unremarkable entranceway, Ann's design makes it difficult to entice potential customers from the street, a crucial necessity for the restaurant's success. As Bob begins his critique he slowly and deliberately circles the restaurant and courtyard with his index finger, concentrating on the area he has identified as the most attractive (line 4.2). As he describes the occluded position of the restaurant Bob holds focus by covering the area with his hand (line 4.4). He then contrasts this positively assessed space to the small entranceway that sits almost unnoticeable at the very edge of the hotel's front facade, holding his finger on the entrance (line 4.6) while uttering that 'this point here has to be so important' — implying that, as it is currently drawn, the diminutive entrance is not significant enough. He then finishes this contrastive sequence by again indexing and circling the restaurant in the back of the courtyard (line 4.7) while completing his claim with 'that you get people into this space' (line 4.7). Bob then attempts to finalize this assessment (lines 4.13–4.16) with what Murphy (2011) calls an 'embedded skit,' a small story-like rhetorical structure shaped to convince an interlocutor that a design detail will or will not work in the real world.

- 4.1 Bob I think what provokes me the bet--the most is like, eh,
4.2 the thing which (.) in itself generates most energy and attraction,



**slowly circles
restaurant**

- 4.3 Ann m:.

- 4.4 Bob you put them into the courtyard.



covers restaurant with hand

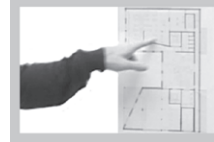
- 4.5 Ann m:hm.

- 4.6 Bob it could be good. but, then this:: point here has to be so:::



**holds index
at entrance**

- 4.7 important, and so strong that you get, people into this space.



circles restaurant

- 4.8 Ann yeah I was--

- 4.9 Bob how do you do that? because that's-- you have challenged
yourself in a concept which is very hard to do for-- in form.

- 4.10 Ann m:hm.

- 4.11 Bob and that could be good. that's good to be-- to dare to do that.

- 4.12 but you have to be able to finish it up in a-- in a fantastic way.

- 4.13 otherwise you could never get me, as a restaurant guy (.)

- 4.14 you couldn't convince me to open a restaurant here because

- 4.15 I know it will be--



circles restaurant

- 4.16 I will be out in a half year.

- 4.17 Ann m:.

[lines omitted]

- 4.18 Bob after the honeymoon with this restaurant. **points to restaurant**

- 4.19 Ann uh-huh.

- 4.20 Bob no one will come there. because they don't find it!

Through the initial sequence of contrastive deictic gestures, alongside his simultaneous verbal description and embedded skit, Bob begins to establish the visual framework for seeing why Ann's design is inadequate. While he never explicitly calls the entranceway problematic, his embodied stance — visually positioning it in contrast to the positively evaluated restaurant while describing it as a 'challenge' — makes it clear that that he strongly dislikes Ann's choice. According to the logic he has deployed, a restaurant located in a closed-off courtyard would never be able to survive.

Having identified occlusion as the central problem in Ann's concept, Bob then introduces an abductive comparison to justify the validity of his assessment. He has claimed that potential customers will be unable to find Ann's restaurant because it is too hidden from the street (line 4.20). He then tells Ann to 'ask Acne,' a Swedish designer clothing brand whose store currently sits directly adjacent to the very empty lot that the students have been working to fill with their hotel designs (line 4.21). As he does so he points to Ann's drawing and indicates the exact spot where the real-world Acne store is located in relation to the hotel that would, in theory, be its neighbor were it actually built. He then elaborates by describing how Acne had originally chosen not to display any of their clothing in their storefront, a high-concept strategy that ultimately did not work, since people were not drawn into the store (lines 4.23–4.28). Acne realized, Bob claims, that they could not hide their merchandise behind a 'cool wall,' which he demonstrates with a gesture (line 4.28), and were forced to change their concept. He then immediately switches back to Ann's poster (lines 4.29), pointing toward it with his palm, and concludes by emphasizing that design concepts cannot be too abstracted from the practical realities that clients face (4.29–4.31).

4.21 ask Acne. Acne have made an- an- a store, here



points to location of real-world Acne store

- 4.22 Ann yeah.
- 4.23 Bob and they begin with a strange concept without, eh,
- 4.24 'we will not show anything eh, to the street.'
- 4.25 now they break the concept. and there is a bad example,
- 4.26 how interior design doesn't work. because, eh, they get anxious
- 4.27 and, 'we have to show what we are selling,' and they can't just be
- 4.28 (0.5) a- a- a- cool wall in some way.



moves hand up then down, miming a wall

4.29 so we have to be very (.) thorough, eh, when we do things for



palm points to Ann's plan

4.30 our clients=otherwise they won't give us commissions.

4.31 yeah, I will stop now.

Bob treats the Acne situation as directly relevant to Ann's design. Just as Acne had hidden their products behind a wall so that they were not visible to the street, Ann has placed the best part of her design, the restaurant, behind a wall that prevents potential customers from discovering it. Like the other critics Bob does not simply state this parallel, but demonstrates his reasoning by interactively linking his comparison to Ann's own work. However Bob's critique is not fully accepted, and Ann feels it necessary to justify the choice she has made. She acknowledges Bob's critique, but then justifies her design by comparing her hidden restaurant to the narrow shopping streets and passages that exist in certain parts of the city. As she begins her defense she describes her own design as 'a little withdrawn from the street' (line 4.33) and 'that you have to know where it is' (line 4.34) while pointing toward her poster with an open palm. She then mentions the well-known passages that exist downtown, which she has already 'seen a lot,' while moving her C-shaped hand back-and-forth to create the contours of a passage (line 4.35). She then invokes the experience of wandering through the passages and discovering a new shop or cafe that you had not seen before while using her hand to trace a 'wandering' path through the entranceway and into the hotel courtyard she has drawn (line 4.36), thereby linking her positive assessment of the real-world environment to her own proposal. Thus like the critics Ann too is using the drawing of her own work to visually explain her original abductive reasoning. However Bob is not satisfied with this reasoning. He claims that while that basic concept has worked for Viktoriapassagen — the area that Ann is discussing — it has not worked in other instances (lines 4.39–4.49).

4.32 Ann yeah, but in a way I think-- I- I understand

4.33 what you say, that it's a:h, a little bit withdrawn from the street



palm rests over restaurant

4.34 and that you have to know where it is. but you also have these,



palm makes a single beat over restaurant

4.35 like, the passages, I've seen it a lot on the city.



moves C-shaped hand back and forth, miming passages

4.36 and you- you go through it by accident



sweeps hand into courtyard on plan

4.37 and you (.) discover a new shop or a (.) a new cafeteria,

4.38 and you're coming in.

4.39 Bob yeah. ah, that's (the point).

4.40 Ann in a way that was the idea. to not--

4.41 Bob yeah, that's the point. but I think in this city we are--

4.42 it's a small city.

4.43 Ann m:

4.44 Bob so we have problems in that. we can't eh-- we can't depend

4.45 upon that things actually happen. we notice in ten years--

4.46 after twenty years that Viktoriapassagen works, actually.

4.47 and- but that's just one place. if we- if we take that concept,

4.48 Viktoriapassagen, and we put it out in three more places in

4.49 Gothenburg, it dies out.

Thus this example reveals a tension. While abductive reasoning may work for a critic to justify his negative assessment of a student's project, it will not necessarily work for students to justify their own choices. Ann engages in the same kind of strategy that the critics have used, relying on gestures and other forms of embodied action to visibly and publicly link architectural references to her work. However while her explanation stems soundly from her own experience of existing commensurate built environments, a resource the critics encourage students to exploit, that experience alone is treated as insufficient without consideration of the local historical implementation of similar design concepts.

6 Discussion

In all of these examples the critics organize their critiques by selecting specific physical features that are readily visible in students' drawings, and through abductive reasoning identify from among countless possible candidates what they treat as *similar* features in already-existing structures to both elaborate and justify their negative assessments. In the first example Tom focuses on the irregular corridors and rooms produced by Bill's Z-shaped hotel design, and compares them to PLOT's VM Hus in Copenhagen. In the second example Jon compares the balconies that Sue has drawn to projects by C.F.

Møller and Wingårdhs, which also included prominent balconies. In the third example Jon singles out the closed bottom floor of Eve's hotel superimposed with a description of a building by Lars Ågren; and in the final example Bob invokes a local Acne store's decision to hide their clothes behind a wall as a specific case study relevant for understanding the problems with Ann's design.

While there are several differences among these examples in terms of how the interactive reasoning sequences proceed, a number of patterns also emerge. First, they all tend to unfold in structurally similar ways. Each is initiated by a critic — and in one variant, a student — identifying a target detail that is publicly visible in the student's work, on a plan, elevation, or scale model, often accompanied by gestures that highlight the detail under discussion. The critic establishes the interpretive framework for seeing this detail critically by first assessing it as problematic in its own right; that is, it is characterized in terms of its general inadequacies, for instance its suitability for a Scandinavian climate, or its lack of visibility to the street. After this framework has been activated in the interaction, the critic (though in one case it was a different critic) then offers a comparison feature extracted from another architectural reference intended to illuminate the student's choice in some way. Often this involves an embodied demonstration of some kind that extends, if only temporarily, the relevant visuospatial field beyond the student's drawings and models to include information otherwise not available in those media, for instance Tom's gestural enactment of angled corridors, or Bob's quick 'cool wall' gesture. Finally, the student's work is reanimated in relation to the source comparison as critics direct their eye-gaze and pointing gestures to the students' models and drawings and use them as the staging ground for verbally describing and visually reinscribing their references. By aligning student work with existing projects in this way critics are able to place students within the canon of architectural knowledge, which in effect renders their work, and the problems they face, relevant to the profession as a whole and ordains them, in a sense, as nascent professional architects.

A second pattern is the noticeable lack of typical analogical linguistic phrasing in constructing these comparisons — the only instance in the examples presented occurs when Jon utters 'just like this' when comparing the bottom floor of Eve's building to a building by Lars Ågren. Instead, rather than simply relying on grammar to do the work of linking target and source in their analogical reasoning, the critics use embodied forms of action to draw visible connections in immediately resonant ways. By highlighting and demonstrating problematic features in multiple communicative modes the critics are not simply asserting abductive links, but are appealing to a basic form of mundane sense-making, the presumed shared understanding of *what we all plainly see before us*, which in effect transforms otherwise unspecified components of

a larger design into a what amounts to *complications* entailing a kind of public accountability. In face-to-face interaction such complications usually crave accounts, and in these examples descriptions of architectural references and their multimodal lamination onto a student's drawings and models do indeed provide publicly analyzable accounts not only for why the feature is problematic, but also for how the student might fix it.

These examples, and others in the data, can also be grouped into at least two broad categories that emphasize the different kinds of work the reasoning sequences are doing in the crits, and socialize students into different ways of using architectural knowledge. The first category is called *projects*, and would include the first two examples above. These are references that critics use to identify and frame a problem with a focus on structural or aesthetic issues, and are shaped to reveal the reasoning process used by professional architects to solve the identified problem. This reasoning does not presume that the student has seen or experienced the references first hand — though critics often do expect the student to be aware of them — nor are project references particularly experienceable, either because they were built in other cities in Sweden or abroad, or in some cases because they were never even built at all. Project comparisons often allow for critics to discuss broader aspects of the design process, such as dealing with clients and builders and other allied professionals, or perhaps even to reveal failures or mistakes along the way to creating a workable solution. The projects invoked can either be those that the critic himself or herself has worked on, thus adding a sense of personal investment to the comment, or other well-known projects that stock the architectural canon. Projects are thus often disconnected from the student's direct knowledge and experience, and the critic works to *contextualize* them for the student's benefit.

A second category alongside *projects* are what we call *places*, architectural references that critics use with a reasonable expectation that students have experienced or can experience it first hand (for instance, the last two examples above). In our data set these tend to be buildings in and around Gothenburg, Sweden, often in the same area of the city where the university was located, or in popular shopping areas. Critics invoke places to explain why certain design features proposed by the students will or will not work 'in the real world' *from the perspective of the user*. Given that the designs that students propose exist only in conceptual form it can be difficult to fully comprehend the effects that specific design choices might have on actual environments, if they were to be built. As exhibited by the reasoning of the critics, this difficulty can be partially ameliorated by directly observing a building that shares some of the features of the proposals. Thus experiencing certain buildings in the student's own everyday world can act as proxy for experiencing their own work. In making reference to such buildings critics rely on a shared sense of 'seeing for oneself' as a warrant for the validity of the comparison. They may elaborate the connections between the place and the student's design in

a number of ways, but the logic of the comparison is primarily founded in an appeal to direct experience — with the presumption that the students will experience the places exactly as the critic has. Places are thus often connected to students' knowledge and experience, and the critic works to *re-contextualize* them for the students' benefit.

7 Conclusion

We have tried in this paper to expand and illuminate discussions of how reason works in architectural critique. The most obvious intervention we have made is to examine reasoning as it emerges spontaneously in naturally-occurring face-to-face interactions, along with focusing on the role played by embodied communicative forms, like gesture, in these practices. Rather than primarily approaching reason as a cognitive faculty encased in individual brains, we have worked from the perspective that reasoning is a mundane achievement supported by social, material and linguistic contexts and serving communicative and sense-making purposes endogenous to specific activities — in this case, activities specific to architectural education. By using the lens of abduction we have tried to reveal the relatively *ad hoc* nature of real-world analogical reasoning, which typically proceeds not through strictly logical procedures but rather through the application of hypothetically similar cases, a technique potentially fragile enough that it entails a fair amount of maintenance through different kinds of communicative work. We have also tried to show that analogical reasoning does not necessarily primarily concern problem solving narrowly conceived in architectural critiques, though most of the examples we have presented do indeed contain problem solving elements. As Schön (1979) has pointed out, such reasoning is also fundamental to the problem setting activities that precede a search for solutions and establish the parameters by which that search can be carried out. After all, many of the features identified by the critics only *become* problems once they are activated within these reasoning sequences.

Our analysis also reveals that setting problems in critique contexts is an interactive procedure that simultaneously draws from and projects a body of professionally relevant knowledge that students are expected to confront and absorb in their lives as architects. That students are expected in various ways to *learn* from their professors and critics in these sessions is, of course, appreciated by the students. However what we have tried to illuminate here are some precise examples of how specific information is made immediately relevant to students themselves in the flows of real-time instruction. One of the central ways in which this is accomplished is through the use of abductive reasoning within account-making practices. Such practices offer a means by which to introduce relevant architectural knowledge in several different ways. Some of these sequences involve implicit or explicit information specifying practical solutions to the problems set by the critics, often framing the problem exhibited in the student's work as a general problem faced by other practicing professionals. By naming specific architects and projects the critics index the precise

(kinds of) knowledge that students are expected to master. At the same time, by encouraging students to think through their own experiences of the buildings around them the critics also demonstrate that relevant professional knowledge is not entirely restricted to particular architectural references.

Indeed, architecture more generally involves a kind of tension between specialization — in language, design, and graphical expression — and an acknowledgment of the everyday experiencer — of built environments, and also of representations of those environments (Lymer, 2009). Doing architecture is a specialized technical endeavor lodged firmly within, and accountable to, the everyday, both in terms of the architect's interaction with clients and builders, and through the building's interaction with users. Overall, in architectural critique sessions critics offer a powerful model for how to think and work like a good architect within that mode: use architectural references to see and understand your own (and others') work, but also make use of your everyday experiences as an inhabitant of the built environment.

Notes

1. For more on the development of Peirce's thinking on abduction, see Burks, 1946, Hoffmann, 1999.
2. In contrast to what Goodwin (2003) describes, rather than using present objects as local metrics for non-present circumstances, Jon uses a non-present — but easily observed — building to explain the student's publicly visible drawings. Place references of this sort thus expand the scope of what counts as 'local' in local metrics and exploit that at-hand proximity to enhance the force of the account that the comparison provides.

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