Sociogeneses, activity and ontogeny

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Abstract

Understanding relations between the social and cognitive contributions to thinking and acting has become a pressing goal for psychological theorising. Central to understanding these relations is the negotiation and construction of knowledge that comprise the inter-psychological processes that engage both the cognitive and social experiences. This paper proposes that these processes can be understood through a complex of relations among different sociogenetic sources and between those sources and individuals' agency as constituted by their life histories or ontogenies. Rather than a single sociogenetic source, the social contributions are held to have historical-cultural and situational geneses. However, through inter-psychological processes these contributions are mediated by individuals' unique and socially-shaped cognitive experience. Findings from an investigation of the same vocational practice (hairdressing) conducted in four different work settings identified tentative relations between the sociogeneses of the goal-directed activities that individuals engage in, and how these individuals represent their knowledge in memory. Hence, both sociogenetic and ontogenetic contributions are proposed as being realised through reciprocal processes of knowledge construction. Evidence of a patterning of contributions of socio-historic and cultural levels of development are presented, as are situational factors that constitute the particular social experience, and cognitive representations that reflect evolving ontogenetic contributions. This patterning extends to conceptualising vocational activities, the determination of the goals for activities, and selecting the action (procedures) to be taken. Together, these findings tentatively elaborate particular sociogenetic contributions to individuals' thinking and acting, and relations between particular elements and phases of goal-directed activities and, hence, their impact on cognitive change (development).

Sociogeneses and ontogeny

The relationship between human cognition and the social world represents a significant issue for psychological theorising. Despite the widespread acceptance of a social basis to cognition, the relations between the cognitive and social experience are not fully elaborated. Much of the emphasis in recent theorising has been on socially-constructed spaces, activities, artefacts and interactions. While these have done much to shift theorising from focusing on the individual, they may have served to de-emphasise individuals as themselves being socially shaped through their life histories or ontogenies. These histories have led to particular identities, subjectivities and ways of knowing, that likely influence their interactions with the social world including how they construct knowledge, inter-psychologically.

Sociocultural activity theory proposes that the goal-directed activities individuals engage in have their geneses in historical and sociocultural lines of development and that individuals' ontogenetic development arises microgentically -- moment by moment -- through engagement in these activities or actions (Cole, 1998; Scribner, 1985; Rogoff, 1990). Hence, associations are proposed between sociogenetic sources (activities) and individuals' cognition. These historically and culturally derived activities are held to be constituted situationally through local interactions and negotiations (Engestrom & Middleton, 1996) and local orderings (Suchman, 1996; 1997), which are a product of and are shaped by the situation's activity systems (Leonteyev, 1981; Scribner, 1997/1988; Engestrom, 1993). These situational contributions shape and distribute the activities individuals engage in and the goals by which these activities are directed and engaged with microgenetically. Reciprocally, individuals' agencies mediate their engagement in and the enactment of these activities with cognitive change arising through this engagement (Billett, 1997). However, the complex of relationships that comprise the interaction between the social and cognitive experience needs to be understood more fully in order for the sociogeneses of knowledge to be elaborated. In particular, understanding how the cognitive legacy of sociogeneses requires an elaboration of the interrelations between knowledge that has historical and cultural geneses, yet constituted by situational factors, and that which constitutes and is a product of individuals personal histories or ontogenies.

It is proposed here that: (i) there will be distinct contributions from historical and cultural sources of knowledge; (ii) yet these contributions will be shaped and privileged by situational practices; (iii) however, individuals' ontogenies mediate these culturally and situational contributions in ways that shape individuals' actions and contribute to their on-going development and (iv) that relations exist between different sociogenetic elements and particular contributions to individuals' enactment of goal-directed activities. In sum, these findings are used to advance empirically the significance of multiple social bases of knowledge (sociogeneses), to illuminate the mediating role of human agency and to speculate about relations between particular sociogenetic contributions and particular elements of cognitive activity and development. The paper commences by discussing and distinguishing among different elements of sociogeneses. Next, the procedures used in the collection and analyses of data are discussed, followed by an elaboration of the contributions of cultural practices, situational factors and individual history to goal formation and procedural activities. In all, the paper intends to illuminate relations between individuals' social and cognitive experience

through identifying the contributions of different elements of what constitutes the social experiences and how individuals' ontogenies mediate that experience.

Sociogeneses of knowledge

Within the Vygotskian view of sociocultural theory, the activities in which individuals engage in and through which their cognition is transformed are held to have historical and cultural geneses (e.g. Cole, 1998; Rogoff, 1990; Scribner, 1985). These accounts refer to four lines of development or sources comprising the: (i) phylogenetic --- the evolving history of the human species; (ii) sociocultural --- development which reflects particular cultural need; (iii) microgenetic development --- the moment-by-moment problem-solving which occurs through individuals' engagement with the social world; and (v) ontogenetic development --- the evolving base of individuals' socially constructed knowledge as a product of their life histories. However, these levels need to be augmented by a consideration of the contributions of situations and situational factors. The basis for this exploration of these socio-genetic levels or sources is on a vocational practice (hairdressing) cast here as a sociocultural practice.

Sociocultural practice

Sociocultural practice is viewed as being a cultural practice that is derived historically or phylogentically (see Figure 1). This practice reflects a cultural need (Scribner, 1985) that evolves over time and comprises an identifiable set of values, technologies and, norms and practices. In the form of paid work, vocations provide examples of sociocultural practice (e.g. lighthouse keeping, doctoring, hairdressing), as they reflect a cultural need that is transformed over time, as needs and technologies change. For instance, within a culture there are likely to be shared cultural expectations of these vocations and the kinds of norms and practices practitioners adopt that arise fro this need. There are technical and values-based expectations, such as doctors being able to diagnose sickness and recommend appropriate remedies, and demonstrating patient confidentiality in their commission of their practice. There are also particular cultural needs that are manifested in these practices. For instance, the vocational practice of hairdressing has a different historical genesis than barbering. This has resulted in distinct clienteles, practices and techniques. There are also hairdressing salons that provide particular kinds of hairstyles (e.g. Rastafarian and beaded African styles) that also employ different techniques and practices that reflect a cultural practice that has different origins and have distinct clienteles. To take another example, each particular cuisine represents a cultural practice, with its techniques, recipes and array of dishes. Regions of China or India, for instance, have variations of this cultural practice. So these categories of sociocultural practices are not intended to be wholly distinct and exclusive, they represent a basis for understanding a level of development that reflects particular cultural need and represents a particular line of development.

Situational factors

However, to identify fully the sources of these goal- directed activities there is the need to go beyond a consideration of sociocultural practice. A vocation as a sociocultural practice is abstracted or disembedded

from actual practice (i.e. the circumstances where the vocational practice is enacted). It remains a set of expectations, goals, technologies and procedures that only find actual form and purpose when they are enacted in particular ways in particular circumstances. As Scribner (1984) explains, these practices are inseparable from their social context, as they embody particular sets of cultural needs and expectations. So although cultural need might broadly constitute expectations about a vocation, how it is enacted will also be shaped by situational factors (see Figure 1). So, despite its historical legacy and expression of cultural need, sociocultural practice in the form of a vocation is not uniformly enacted, as the circumstances of its enactment are likely to be diverse, and have distinct goals and requirements. For instance, how a medical practice is constituted differs according to its location (e.g. rural town, inner-city suburb, retirement community, remote Aboriginal community), its objects (e.g. characteristics of patients in terms of health, age, dispositions), and how the practice is organised (e.g. shared practice, community-based, availability of doctors in rural settings, etc.). Taking the examples from above about regional Chinese or Indian food, how these are enacted will depend on the ingredients available locally, local tastes and preferences. Importantly, the evidence suggests in the form of cognitive representations that through engagement with these activities, hairdressers appropriated microgenetically these situationally-constituted conceptions and procedures (Rogoff, 1990). These suggest the need to include a situation level of practice within sociocultural theory to account for the social genesis of knowledge at the level of social practice were activities are enacted. Therefore, the cultural and historical lines of development (Scribner, 1985), embodied here as sociocultural practice, are alone unable to account adequately for how vocational practice is constituted (i.e. transformed, privileged and manifested) in the particular circumstances of its enactment. Accordingly, there is a need to account for the circumstances in which the vocational practice is enacted as these circumstances shape its forms and goals, and thereby influence the activities in which participants engage, and from which they construct knowledge. One outcome of engaging in shared practices is the prospect of increased intersubjectivity between social partners as cognitive change in the form of a movement from idiosyncratic understanding to a more shared understanding that arises from proximal interactions (Newman, Griffin & Cole 1989). Through engagement in tasks, some of each partners' knowledge is made accessible and shared, thereby reciprocally transforming existing knowledge understanding.

Other theoretical perspectives also emphasise a role for situational contributions that transform or constitute cultural-historical practices in particular ways. Activity theorists propose that activities and actions are the product of and embedded in particular practices, rather then being separable or remote from them (Scribner, 1997/1988). Analyses of work activities using activity theory (Billett, 2001a; Engestrom, 1993), those emphasising the local ordering of practice (Suchman, 1996) and local negotiations and interactions (Engestrom & Middleton, 1996) delineate factors that likely make each instance of work practice in some way unique. Importantly, they propose these practices as being situationally constituted. More than just being instances of historically and culturally sourced activities and practices, the situations where these activities are enacted, constitute and transform these activities. These views prompt the need to consider relations among situational factors, and historical and cultural lines of development to understand how the social experience is constituted.

These relations, it seems, are at least reciprocal --- shaping but also being shaped (see Figure 1). Changes demanded at the situational level such as to procedures (e.g. the kinds of activities the situation demands), also shape the evolution of the vocational practice, phylogenetically. For instance, growing environmental concerns of clients in western countries might cause a shift to find non-chemically based hair shaping treatments, thereby transforming the vocation in response to changing cultural need. This concern contributes to phylogenetic development through the need to provide services that meet evolving cultural needs.

Microgenetic actions

These two levels of sociogeneses conceptualised here as sociocultural practices together with situational factors are held as constituting the goal-directed activities that individuals engage in social practices, such as homes (Goodnow, 1990) and workplaces. For instance, Goodnow and Warton (1991) refer to the distribution and expectations of engagement in household tasks being shaped through the interplay between particular cultural values and particular family situation (i.e. what is taken as tasks assignable to males and females) (see Figure 1). Goal-directed activities also provide useful bases for understanding further the relations between individuals' cognitive processes and development and the social sources of knowledge as constituted in the activities and goals located in social practice (Cole, 1985). Engagement in goal-directed activities is held to promote the psychological function of the learner (Leonteyev, 1981), in ways consonant with what is proposed in cognitive theory about engagement in problem-solving actions being associated with cognitive development (e.g. Anderson, 1993; Shuell, 1990), anthropological accounts about practice and learning (e.g. Lave, 1993) and sociocultural perspectives on the relations between participation in social practice and learning (e.g. Rogoff, 1995). In cognitive theoretical terms, engaging in conscious and goal-directed activity necessarily involves the reinforcement, refinement and/or transformation of individuals' knowledge structures. The routine and non-routine activities that individuals continuously engage in have consequences for the ongoing process of securing equilibrium through assimilation, as Piaget (1966) proposes, and for what von Glasersfeld (1987) refers to as maintaining viability. Although not always recognised as such, engagement in routine everyday activity is an essential component of human development. It assists with the reinforcement, refinement and easy practise of much human thinking and acting. From the cognitive perspective, the outcome of this engagement is the gradual reduction in the demand of conscious thought required for the subsequent deployment of this knowledge (see Anderson, 1982; Shuell, 1990). Non-routine activities are held to develop new cognitive structures from transformations of existing structures or the creation of novel structures, as in accommodation (Piaget, 1966). That is, engagement in novel activities extends individuals' knowledge structures in terms of their categories and organisation. Therefore, more than merely being deployed to complete an action or task, individuals' cognitive structures are reinforced, refined or transformed by engagement in activities. Because these activities are socially constituted, this development is proposed as being shaped by the social sources that are generative of those activities. This suggests that the legacy of engagement in socially derived activities become unconscious elements of human behaviour, or an intra-psychological outcome as Vygotsky (1978) is held to propose. For example, through use, we refine our

spoken and written language. However, this use is not solely a mental process wholly separable from the social context in which it is practised. Anthropological accounts emphasise practice (Lave, 1993; Pelissier, 1991), with some conceptualising relations between individuals and cultural practice as the bases for participation in and the formation of identity associated with particular instance of cultural practices being referred to as communities of practice (Lave & Wenger, 1991; Wenger, 1998). As noted in other perspectives, the use of speech results in particular ways of enunciating words (accents) (Bourdieu, 1991) and the granting of particular meaning to words (Confrey, 1991) that are the product of their social milieu, rather than coming from within the individual.

So, the kinds of activities that individuals engage in and resolve are socially constituted at both the sociocultural and situation levels of practice, as are the goals to which their actions are directed. Individuals' engagement at the situational level where the practice is enacted constitutes inter-psychological processes – the interaction between the social and the individuals' cognitive experience that are reciprocal or co-constructive (Valsiner & van de veer, 2000). The second point is salient. Individuals' knowledge construction is not a process of socialisation or enculturation arising from engagement in goal-directed actions, it is reciprocally constructed between the individual and the social source(s) (Lawrence & Valsiner, 1993; Valsiner, 1994; Wertsch, 1998). How individuals engage in activities, such as their paid work, which activities they engage in and what they construct from these activities are mediated by their ontogenies or personal histories (Rogoff, 1990; Billett, 1997) --- the ways of knowing and doing they have constructed throughout their lives. Yet, even when idiosyncratic this knowledge is socially constructed, and in ways that shape how individuals engage with what they experience socially, and, as a consequence, change or learn. Hodges (1998) for instance, decided to dis-identify with the sociocultural practice of teaching after it clashed with her views about how children should be treated. So ontogenies are also socially derived, albeit in ways that reflect the uniqueness of individuals' experiences – their engagement in activities and participation in different kinds of social practice throughout their life histories. Vygotsky (following Bolonsky) is held to propose that 'behaviour can be understood only as the history of behaviour' (1978: 8).

Therefore, considering goal-directed activities within a cultural practice provides a basis to understand the relations between sociogenetic sources and ontogenies (i.e. the relations between the social and cognitive experience) through an examination of the inter-psychological processes that comprise the enactment of these goal-directed activities. Together, both routine and non-routine activities constitute ongoing and 'moment-by-moment' problem-solving processes or microgenetic development (Rogoff, 1990) that are inter-psychological. Therefore, and as captured in Figure 1, microgenetic processes are salient to understanding associations among culturally-historically (socioculturally) and situationally constituted activities, and individuals' ontogenetic development. Through participation in these activities cognitive change arises through interactions between the sociogenetic derived activities and ontogenetic bases of actions. Rather than being either socioculturally or individually determined, these associations are reciprocal or co-constructed (Valsiner, 1994; Rogoff, 1995). Therefore, engagement in goal-directed actions derived sociogenetically is held to reciprocally transform, reinforce or refine individuals' ontogenetically derived knowledge.

Figure 1 aims to depict the reciprocal relations between social practice and ontogenetic development that have been advanced above. It depicts how the historical and cultural geneses in the form of sociocultural practice and situationally-constituted factors shape the goal-directed activities with which individuals engage. It also identifies micro-genetic actions as source of cognitive change. These actions occur at the intersection between the social contributions (the social experience) and the ontogenetic development (the cognitive experience). In doing so, the Figure I proposes a tentative view of how individuals' thinking and acting is mediated reciprocally through microgenetic actions by engagement in socially constituted activities that are historically, culturally and situationally shaped, on the one hand, and socially derived ontogenies on the other. As with ontogenetic development, these sociocultural practice and situational factors are not fixed, they are in constant transformation, as are their relations.

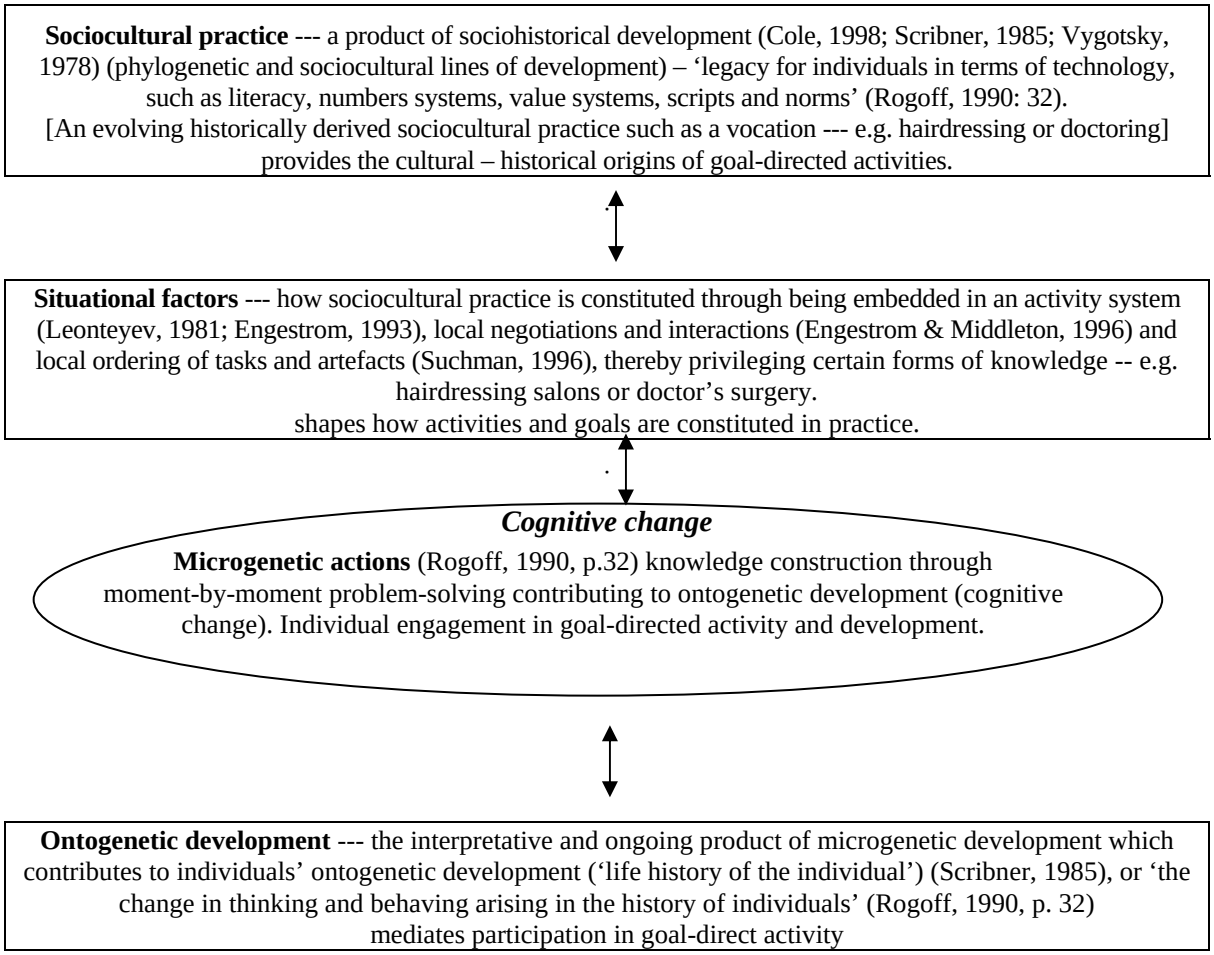

Figure 1 Socially constituted actions and individuals' development

Overall, there are likely to be cultural-historical, situational legacies for human cognition, with the relations between ontogenetic development and situationally-constituted actions, themselves transformations of historically and culturally-derived practices, ultimately shaping those legacies. The next section, describes procedures adopted to appraise these propositions as they were investigated through identifying contributions in everyday thinking and acting at work.

Procedures

Settings and subjects

In order to identify how sociocultural practices and situational factors constitute the privileging of activities in particular social practices, and to identify their cognitive consequences for individuals, the enactment of a common vocational activity was investigated in different settings. As proposed above, if the goal-directed activities furnished by cultural practice and situational factors, can be identified as shaping individuals' knowledge in particular ways, it may be possible to identify links between these factors and individuals' cognitive structures (i.e. concepts and procedures). The sociocultural practice of hairdressing was investigated, as it was constituted in four different settings (hairdressing salons) to map how situational factors constituted the practice in those settings and identify how individuals in those settings respond to the same set of vocational tasks. Hairdressing salons were selected in four locations. These settings comprised: (i) an outer- and (ii) an inner-city suburb of a metropolitan centre in Australia; (iii) a provincial rural centre; and (iv) a town in northern England. The workplaces were selected on the basis of variation in the location and circumstance of their practice (i.e. a fashionable inner-city suburb; a low socio-economic suburb, a rural centre and a setting on another continent) and their ability to provide access to both experienced hairdressers and apprentices in the latter stages of their indenture. Across the sites, eleven hairdressers participated in the investigation, four of whom (one at each site) were final-year apprentices. The other seven were experienced hairdressers.

Data gathering and analysis procedures

The investigation comprised two sequenced phases of inquiry. Each had a distinct orientation, although the key concern was to overcome the tensions arising from inter-disciplinary work by achieving an interaction between the two disciplines, thereby affording coherence. The coherence was aimed to be to achieved through aligning an anthropological–like study of cognitive content with a psychological study of cognitive process. The first phase of inquiry investigated the activity system of each salon. A micro-social analysis of societal conditions, institutional settings and activity structures (Martin & Scribner, 1991) was conducted. Data were gathered through extensive periods of observation and rounds of interviews in each salon. The methodological goals comprised: (i) generating a description of the practice by determining the typical activities of experts and novices during busy work days (Lave & Wenger, 1991); (ii) determining the boundaries of the practice by identifying the social relationships within the practice (Goodnow, 1990; Lave & Wenger, 1991; Luria, 1976); (iii) eliciting perceptions of work practice by securing data from subjects about how they conceptualised and undertook their work, and their interests and preferences for practice (Goodnow & Warton, 1986; Lave & Wenger, 1991; Tobias, 1994); and (iv) through determining subjects' categorisations of clients. Data from this first phase were analysed using in a modified form of Engestrom's (1993) elements of activity system comprising: Subjects (hairdressers); Objects (client community); Community; Division of Labour; and Rules, as well as Location and Layout; (Billett, 1998).

These modifications were undertaken to account more fully for the situational contributions to activities conducted in the settings that were shaped by the salons' location and the physical setting in which

the activities were conducted. Data from the first phase of inquiry are not reported in any detail here. However, they are used to validate the analysis of the second phase of the investigation, which forms the majority of data presented here. These salons had differences in their: (i) modes of operation; (ii) division of labour; (iii) approach to hairdressing; and (iv) goals for hairdressing tasks (Billett, 2001a). For instance, some of the salons distributed the hairdressing task across the hairdressers, albeit in different ways, while in one salon the practice was for one hairdresser to conduct the entire task. There were different bases of engagement in each of these workplaces (e.g. employer, manager, apprentice, owner, partner). The division of labour extended from shared tasks to some tasks being restricted to all but owners in some salons, yet conducted by apprentices in another (e.g. ordering of stock). The norms of practice were as diverse as a focus on 'new ageism' in one salon, to a rule in another that there was to be 'no yappers' – that is, the hairdressers were not permitted to initiate conversations with clients. The differences in goals extended from giving transformational haircuts, to guarding against forceful and frequently complaining clients, through to being a friend and a confidant to lonely old ladies.

The second phase gathered data on the subjects' responses to problem-solving tasks, and analysed these responses in terms of their representations as cognitive structures. A set of four identical hairdressing problem-solving tasks was administered to each subject. The aim was to secure rich accounts of the subjects' knowledge through analyses of their responses to these tasks. Ill-defined problems were selected, to elicit rich accounts because they require responses to both start and goal states as the procedures for the task completion are unclear (Voss et al., 1986). The problem-solving activities were conducted as follows. The hairdressers were given sets of photographs (front, back, side of head and neck and full-frontal images) of each of four 'would-be' clients and asked to address an ill-defined problem pertaining to each of the sets of photographs, one at a time. The responses were recorded and converted into verbatim printed protocols. These protocols were then analysed using the phases of hairdressing activity and through an identification of the data that was pertinent to particular phases of the hairdressing process. From this analysis, goals for and procedures used in the hairdressing task became a central bases for analysis. The hairdressers verified the bases of the data analysis, through assisting in establishing a model for the progress of the hairdressing task. They also verified and justified findings about hairdressing concepts and practices that were (i) broadly applicable across the hairdressing practice in their countries as it was commonly constituted and (ii) those that were pertained particularly to their particular salon.

Findings

The findings are reported here through three levels of analysis: (i) identifying the source of the social contributions to knowledge (i.e. sociocultural, situational, ontogenetic); (ii) linking the sources to particular kinds of cognitive structures (i.e. concepts and procedures); and (iii) linking the sources of knowledge to phases of the goal-directed activity of hairdressing. In each, there is necessarily an explanation, justification as well as illustrations of the analyses undertaken, and reports the outcomes of these analyses. This presentation commences by providing a 'worked example' of one protocol that identifies, describes and justifies the identification of the source of knowledge allocated to each protocol

segment (Table 1). This 'worked example' draws on data from the first phase of the investigation and illustrates the mode of analysis used across the data.

Identifying social sources of knowledge: A worked example

The first set of findings identifies and justifies the identification of the sources of the hairdressers' representations of knowledge. The 'worked example' presented in Table 1 identifies links between segments of the protocol data and their sociogenetic source. The example is of the first 20 lines from subject's A1 response to Problem 2, one of over 40 protocols analysed during the second phase of the investigation. The problem comprised a female client with shoulder-length hair who wanted a change. In his way, the problem was ill-defined as it required a consideration of the kind and degree of change that was required and also the condition and history of the hair (e.g. what treatments had it been subject to). Table 1 has three columns. The left-hand column presents the protocol segment of the problem-solving task. The justification for linking the source of the knowledge represented in the verbal data is provided in the middle column (i.e. cultural-historical (CH), knowledge privileged in the particular practice (SP) and the individuals' personal history (IH)). The justifications draw upon observational and interview data from the first phase of the investigation. References to justify the source of knowledge are reported in parentheses. The codes used in this table are as follows. The hairdressers are referred to using a unique alpha and number code. They are numbered 1-11, with the prefix alpha character indicating the salon in which they engage. The salons are A (an outer suburban salon in a metropolitan city), C (a salon in a provincial rural setting); F (an inner city salon) and O (a salon in a town in England). For instance, A2 is one of two hairdressers employed in Salon A. The reference to the data supporting the deductions from the data are those that refer to the protocols of an individual responding to a particular problems (e.g. F6 PR#2 – subject F6's protocol for Problem 2), those that refer to all the responses to a problem (e.g. PR#1 ALL – all 11 subjects' responses to Problem 1) and those that refer to all of the data from all subjects (ALL). Coding ALL refers to evidence derived from the overall analysis of the protocols.

In the right-hand column, the identified source of the knowledge structures represented in the verbal data is indicated as provided in Figure 1 (i.e. cultural historical (CH), situationally constituted (SP) and ontogenetic (IH). This categorisation was based on identifying evidence that the segment emphasises something that was likely to be common to the sociocultural practice of hairdressing as it was conducted in Australia and the United Kingdom (CH). So responses common across the four settings are held to be sourced in the sociocultural practice of hairdressing, which has goals, technologies and practices arising from particular cultural needs (Scribner, 1985) for hairdressing in those countries. In follow-up interviews, the subjects validated these responses as being common to hairdressing as it was typically practiced in these countries. Responses reported as being associated with particular salons and labelled as SP are those held as those shaped by the salon's activity system (Engestrom, 1993) and local negotiations (Engestrom & Middleton, 1996) and orderings (Suchman, 1996). Labelled as IH are those responses that are held as being sourced in individuals' ontogenies or personal histories. Rather than being merely idiosyncratic, the interview data identified links between atypical responses and subjects'

personal histories. That is, these responses were identified, through instances provided in the interviews, as being sourced in the individuals' life histories. These included individuals' preferences and values that were identified as having particular bases in their life histories. Therefore, components of the representations of knowledge as expressed in the verbal data were identified as being most associated with one of these three sources i.e. sociocultural practice, situational factors and individuals' personal histories. An example, that provides an elaboration and justification of this analysis is presented next in Table 1.

Table 1 -Worked example of Subject A1, PR#2

Protocol segment	*Justification for identified source of knowledge*	*Source*
1 She's a very oval face.	This initial conceptualisation of the client is based on sociocultural concepts of hairdressing, as evidenced in the common usage of face shape across settings to consider what treatment would suit the client. In total, eight subjects referred to the client's face shape when addressing this problem. Determining the face shape was used to guide the hairdresser towards a particular goal. However, although this conceptualisation of the face shape is socioculturally derived, her conceptualisation (oval) was not shared by the other subjects. From the same salon, A2 concludes a solution similar to A1 --- a short haircut (A2 PR#2). From his consideration of the face shape, F3 concluded that a longer 'threaded' type of cut would be appropriate (F3 PR#2); he even considered not cutting the hair at all. F4's initial conceptualisation of the client's face was to describe her as being beautiful (F4 PR#2) and that the client does not need any hair at all; however, F4 concluded that her face would suit a long perm with a variety of curl sizes and textures. F5 concluded that the client had a good face for short hair (F5 PR#2), but also for long pieces which featured in his solution. F6 referred to the client's face shape (F6 PR#2) and concluded that it was possible to take advantage of the length of the hair for styling purposes. O10's initially conceptualised the client as having a long forehead (O10 PR#2), recommending the hair come down over the face because of this. O11 reported the importance of face shapes (O11 PR#2) and concluded that a below-the-ears bob would suit this client. So, although A1 was responding to a socioculturally derived conceptualisation of the face shape, the solutions were quite different across the subjects in the conceptualisation of goals. Individual differences of this kind were identifiable as being the product of events in the individuals' personal history. Therefore, the *personal history* of A1 appears to shape the initial conceptualisation of the client.	IH
2 Not as long as the other lady.	This was a judgment that would be shared by others. A1 refers to the pictures used in the first problem (PR#1), whose length of face was referred to by seven of the subjects in the earlier problem (PR#1ALL). Consequently, it would seem that such a judgment was sourced from *sociocultural practice*.	CH
3 How much of a change she wants to go for?	This question addresses a *socioculturally* derived goal of determining 'how far you can go' which, although meaning different things across the settings, remain as a question sourced in sociocultural practice. It was the way such a sociocultural goal was privileged in particular settings and interpreted which involved the utilisation of other sources of knowledge.	CH
4 I'd perhaps take it quite short into a bob,	The sociocultural norm, as evident in the overall analysis of the protocols (ALL), was that changing long hair usually meant cutting it shorter. The solution may well be sourced through sociocultural practice, because the client had straight hair that lent itself to a bob. However, given what follows it would seem the initial conceptualisation and recommended procedures were sourced within the *particular practice*, as socioculturally derived but shaped by the norms and practice at Salon A.	SP
5 but keep it, her hair on her face. *6 So she's still got it around her face.*	These responses were common in Salon A, with the other subject also making reference to hair coming down over her face (A2 PR#2). A similar approach was referred to for the first problem (A1 PR#1) and by both hairdressers in the fourth problem (A1 PR#4; A2 PR#4). During observations at this salon, it was noted that part of the finishing effect at Salon A was to brush hair into fringes or pieces that came across the face (Salon A). This would suggest that the conceptualisation and procedures were the product of the *particular practice*.	SP
7 So, take it quite short into the neck,	This procedure is classified as being sourced in A1's *personal history*, as this solution appears unique.	IH

Protocol segment	*Justification for identified source of knowledge*	*Source*
8 but leaving it longer at the ears, *9 so it springs on to her face to soften her face up.* *10 She does need something on the face.]*	As stated above this approach to hair cutting was evident in protocols (PR#1; PR#2; PR#4) from A1 and A2. It was also an approach observed at Salon A. Therefore, this solution is viewed as a version of a short haircut favoured at that *particular practice*.	SP
11 And perhaps just layer up a fringe.	This procedure was observed being conducted at salon A by A1 (Salon A), yet is seen as being her version of the type of treatment required at Salon A, but because it was not shared with A2, it is regarded as being sourced more in her *personal history* and preference (Salon A). That is, the hairdresser exercised her agency in within the range of options available to her in Salon A.	IH
12 Probably put coloured highlights in her hair to brighten her up. *13 Make it a lot brighter.*	This procedure and justification are seen as being of sociocultural origin, as the addition of colour, for this problem, was suggested at two other sites. F3 stated that the client needed colour (F3 PR#2), with F5 stating colour would freshen up her tired looking blonde hair (F5 PR#2) and C8 recommending a colour to give the hair a shine (C8 PR#2). C9 similarly recommended a colour to improve the appearance of the hair (C9 PR#2). So this conceptualisation and problem solution displays a strong influence of hairdressing's sociocultural origins. However, as streaks were a common treatment only at this salon (Salon A), A1's solution was a version of the sociocultural norm, shaped by the particular practice.	SP
15 Yeah, I'd put nice copper highlights in her hair. *16 To give it a lift.]*	As stated above, this procedure and justification were sourced in the *particular practice*, being that salon's version of the socioculturally derived solution to this problem.	SP
17-What does she do for a living? [TG] *18-Her lifestyle.*	These questions are *socioculturally* determined. For example, in Problem 1, A1, F5 and F6 (ALL#1), Problem 2, A1, F5, F6, C7, C8 and O10 (PR#2ALL) and Problem 4, F3 and F6 (PR#4ALL), all refer to determining information about clients' lifestyles. It is proposed that the conceptualisation underlying this questioning is *socioculturally* derived.	CH
19-You need to know how often she washes her hair and that	This conceptualisation has a sociocultural basis with concerns about clients' care of hair being stated by A1, A2, F6, C9 and O10 in Problem 1 (PR#1ALL), A1, A2, C7 and C9 in Problem 2 (PR#2ALL), A2 and F4 in Problem 3 (PR#3ALL), and in Problem 4 being referred to by A1, A2 and F6 (PR#3ALL). However, although clients' care of hair was a concern for all salons (ALL), it was privileged at Salon A, where chemical treatments were quite frequent (Salon A) and this concern was heightened (Salon A). The incidence of clients' complaints about treatments at this salon has been attributed to clients' lack of hair care (Salon A). So, although this is canonical knowledge, it is privileged at A through its relationship with the frequency of chemical treatments, and is therefore sourced in that *particular practice*.	SP

Identifying links between social sources and particular cognitive consequences

In order to strengthen, consolidate and refine further the propositions presented in Table 1, the entire set of verbal data as well as the findings from the anthropological study of cognitive content are now used to identify relations between sociogenetic elements and particular phases of the goal-directed activity. The intention here is to provide a finer analysis and greater elaboration of the propositions advanced through the worked example. Accordingly a synthesis of the analysis of all 40 problem-solving protocols is used to identify how propositional and procedural kinds of knowledge are utilised in problem-solving to establish their association with particular sources. The description of the findings commences with the reporting of responses common to all four settings, which are taken as representing socioculturally sourced knowledge of the hairdressing vocation as it is enacted in the cultural context of Australia and the United Kingdom. This is followed by representations that are identified as being common to a particular setting and those that are unique yet associated with the individuals' personal histories. Within these discussions, the findings are classified into sub-categories of concepts (goals, sub-goals and related concepts) and procedures (strategic actions and techniques).

Socioculturally sourced knowledge

Common goals, sub-goals and concepts

There was commonality in responses across all four settings in the conceptualisation of the overall goals and sub-goals for hairdressing activities as well as specific concepts associated with the sociocultural practices of hairdressing. The goal of client satisfaction, with its sub-goal of achieving consonance between the hairdresser's and the client's understanding of those goals, was evident across all four settings. For example, when a transformational haircut was being proposed, hairdressers typically expressed particular concern about client satisfaction. Common concepts used in selecting sub-goals associated with client satisfaction include: clients' management of their hair; characterisation of clients (e.g. face shape, person type, concerns); and sub-goals related to their hair (e.g. bulk, balance, condition) (see Table 2). For example, judgments about clients' ability to care for their hair treatment were a consideration in goal formation at all four sites. There was a common goal associated with appraising and securing client satisfaction, particularly when chemical treatments were involved, as these required the need for ongoing care and maintenance by clients. Concepts commonly associated with the condition or characteristics of hair were also identifiable. Long hair was commonly assumed to be unhealthy and/or not well maintained, for example. Significantly, the subjects initially conceptualised the 'would-be' clients in the photographs with a high degree of consistency. All but two subjects commented on there being too much bulk at the base of the neck of one 'would-be' client. The two exceptions were both apprentices (i.e. novices). The majority of subjects also conceptualised a problem in the balance of that client's existing hairstyle. With another problem, subjects universally conceptualised the client's hair as being long, resulting in the common intent to shorten it. So commonality across all four sites was identifiable in the overall goals, sub-goals and

concepts used to categorise clients and their hair, thereby generating goals for hair treatment procedures.

Common strategies and specific procedures

Some strategic and specific procedures were also identified as being common across the four sites. For example, common procedures were used to respond to client complaints (Table 2). So, despite their remoteness from each other, at each site, common strategic procedures were reported as being deployed to secure the overall goal of client satisfaction. Common procedures were also evident in the analyses of the current cut and condition of clients' hair. These procedures are used to formulate goals for actions. A common set of procedures for securing client satisfaction is to: (i) determine what the client wants; (ii) negotiate and work towards an agreed goal and (iii) monitor and respond to client requirements to achieve a satisfactory outcome. Specific procedures, such as cutting, colouring, chemical application, sets and perms were also commonly utilised across all four sites. Also, procedural responses for resolving a client complaint were identified. Common procedural responses were reported for particular kinds of conditions (e.g. thick/bulky hair, changing long hair, achieving softness, and responding to a facial birthmark) which, given their almost universal reporting, are taken as having their genesis in the sociocultural practice of hairdressing (Table 2). In these examples, regardless of setting, the same conceptualisations of clients' hair resulted in the deployment of the same specific procedures.

Table 2 presents a synthesis of the procedures that are common across the four settings. Strategic procedures are presented at the top of the table descending to specific procedures at the bottom. At each level are examples of procedures is provided as well as the sources of evidence supporting the claims for it to be seen common across these settings. In these findings are concepts and procedures that were identified as being common across the four hairdressing salons. These represented quite specific common concepts as well as common goals. Also specific procedures as well as those of a more strategic kind were identified. These are held to represent the sociocultural practice as identified in Figure 1 – the canonical practices and concepts of hairdressing as it is typically performed in these countries.

Table 2 – Procedures common across the four sites

Common strategic procedures	
Securing client satisfaction	
Common strategic procedure to secure client satisfaction (ALL). (i) determining what is required/desired; (ALL) (ii) negotiating and achieving what is required to satisfy client; and (ALL) (iii) monitoring clients for indications of satisfaction. (ALL)	
Common strategic procedure --- Resolving a client complaint (ALL#3)	
Procedure	Subjects
(i) Determine problem	A1, A2, F3, F4, F5, F6, C8, C9, O10, O11
(ii) Cheer up/reassure client	A2, F3, F4, F5, F6, C8, C9, O10
(iii) Fix up the problem	A1, A2, F3, F4, F5, F6, C7, C8, O10, O11
Common specific procedures used during consultation	
Sub-goal	*Subjects --- source of evidence*

(i) Hair condition *(determine what they have got)*	A1, A2, F5, C7, C8, C9, O10 & O11 (ALL#1)
(ii) Lifestyle *(determine what they need - should have)*; and,	A1, A2, F4, C7 & C8 (ALL#2)
(iii) Ability to manage their hair at home *(determine what they will do with it).*	A1, A2, F4, C7 & C8 (ALL#2)

Common specific procedures leading to consistent procedural responses	
Procedural response	*Subjects --- source of evidence*
Birthmark - cover it (yet different approaches are used)	A1, A2, F3, F4, F5, F6, C8, C9, O10, & O11 (ALL#4)
Thick /bulky hair -- reduce it (yet different techniques used)	A1, A2, F3, F4, F5, C8 & O10 (ALL#4)
Changing long hair -- shorten it	A1, A2, C7, C8, C9, O10 & O11 ALL#2) - immediately or A2, F3, F4 & F5
Achieve softness by putting hair over the face	(ALL#2) longer term goal A1, F3, F4, F5, F6, C8 & O10 (ALL #4)

Concepts and procedures common to particular settings

Within each setting, evidence of commonality in both concepts and procedures was also identified. This is taken to be the product of how activities were constituted and privileged by the situational factors of each hairdressing salon.

Concepts common within settings

Concepts common to each settings were identified referring to both strategic and sub-goals. As presented in Table 3, each salon's strategic goals were distinct in particular ways. For instance, the manifestation of the goal of client satisfaction, although common to all settings, is conceptualised differently. Differences include emphases on cost, readiness for change, and an emphasis on clients' ability to manage hair. That is, negotiations about haircutting goals were based on premises (situational norms and practices) pertaining to each setting. These norms were identified as products of each setting's activity system in the first phase of the investigation and the goals and procedures identified in the second. For example, Salon A had a cohort of clients who habitually returned to the salon a few days after their appointment to complain loudly and forcefully about their treatment. The hairdressers labelled these clients as 'awkward' and when cutting their hair emphasised the kinds of care that the clients would have to take of their hair to maintain the treatment they had requested. As the absent owner of the salon habitually sacked hairdressers on the basis of client complaints, the hairdressers worked to manage and satisfy these clients. Hence, the concept of client satisfaction was worked out in complex and specific ways in this setting. In Salon F, a key goal was to provide transformational hair treatments. Therefore, identifying the degree of change that these clients were ready for was a key basis for performance. In Table 3 data on how the goals for performance in each salon are presented. It shows how the kinds of goal-directed activities that hairdressers engage in are shaped by each salon's goals. First it presents each salon's strategic goals. These represent key bases for practice. Below this are the conceptions of client satisfaction and goals for addressing client complaints that are constituted in particular ways in each salon. The conventions adopted in Table 3 are the same as those in the earlier tables. However, in addition where verification interviews were used to validate the findings.

Although the sociocultural goal of securing client satisfaction was consistent across the four sites there were differences across the settings in the sub-goals for responding to customer complaints. In each setting, these differences were linked to situational factors (e.g. concerns about complaints to the absent owner, maintaining business in a small community where criticism travels quickly). Importantly, these sub-goals yield a basis for identifying how workplace tasks are categorised and addressed in the salon.

Table 3 Concepts privileged in settings

Concepts	*Subjects*	*Justification*
Strategic goals of salon[1]		
At A - developing and maintaining clientele	A1/2	interview
At C - maintaining the standing of the salon	C7/8	interview
At F - making change	F3/4/5/6	interview
At O - maintaining and satisfying clientele	O10/11	interview
Goal of client satisfaction (how far can you go?)	*Subjects*	*Justification*
At A - clients' satisfaction and ability to manage it at home	A1/2	ALL#4
At C - what the client can afford this time	C7/8	interview
At F - clients' readiness for change	F3/5/6	ALL#1,2,3
At O - time lapses between treatments	O10	Salon O
Goals when handling customer complaints	*Subjects*	*Justification*
At A - handle problem so client will return/won't complain to boss	A1/2	ALL#3
At C - maintain standing in community -- easy to lose 20 clients	C7/8	ALL#3
At F - past bowing and scraping, is she in the right salon?	F3/4	ALL#3
At O - try to please -- maintain relationship	O10	ALL#3

Note: 1. These data where obtained from interviews as reported in the first phase of the study.

The data presented in Table 3 illustrate how the conceptualisation of hairdressing goals are distinctive. They are used to propose how these hairdressers' goal formulations and means of proceeding were, in part, accounted for by the local ordering within and requirements of each settings. Consequently, the goals for the actions individuals engage in and from which they construct knowledge are constituted by situational demands and needs.

Procedures common within settings

Each setting also privileged particular hairdressing procedures, sometimes identifiable as preferred techniques – 'what we do here is …'(e.g. Trim and Chemical; Cut and Colour). A patterning in the procedures adopted and the range of possible options for responding to clients' needs was also identified. To illustrate this, the preferred solutions to Problem 2 are used to indicate how particular procedures were privileged in each setting (Table 4). The client had shoulder-length hair and wanted a change. At Salon A, the provision of a short haircut with hair over the face was commonly proposed. Also at this salon, the response to a face being categorised as 'round' was to bring hair on to the face, in order to 'reduce the face' (A1) or 'to make the face longer' (A2). At Salon F, the opportunity presented by the client's long hair was commonly seen as prompting styled solutions through using its existing length --- 'we do a lot of threaded type of cuts here' (F3). In this salon, F4, F5 and F6 all viewed their proposed solution as a step towards a shorter haircut in the future, thus maximising the opportunity for a series of transformational cuts which are central to the salon's goals. At Salon C, the preferred solution was to provide a short cut, although there were differences in the cut to be provided.

At this salon, it was stated that, because the clientele was conservative, radical changes in style were unusual (C8). At Salon O, the consistent response was a short bob. The elements of consistency within each setting are proposed as being indicative of the different norms and practices of the salons arising from local orderings and negotiations.

Table 4 Procedural responses (Problem 2) – change required to shoulder length hair

Subject	*Hair cutting procedures*
A1	Short bob -- hair over face
A2	Short -- hair on to face
F3	Leave long pieces
F4	Leave long pieces
F5	Shorter -- but leave long pieces
F6	Leave long pieces
C7	Short with chemical treatment
C8	Short with chemical treatment
C9	Short with chemical treatment
O10	Short bob
O11	Short bob

Situational patterns of procedural responses were also evident in the responses to Problem 4 -- -a client with thick hair that she used to hide a birthmark on the side of her face (Table 5). The consistency of the 'over the face effect' at Salon A, 'piecey' styling options offered at Salon F, the 'neat and tidy' goals being proposed at Salon C, and the similarity of response at Salon O all illustrate the privileging of particular procedures in each setting, which are reflected in the subjects' responses as representations of their knowledge structures. Collectively, the data indicate patterns of goal-directed activities common to the particular setting where the hairdressers use and transform their cognitive structures microgenetically (Rogoff, 1990) through everyday activities. In instances where subjects offered responses outside the norms of the practice, they were usually principal participants (i.e. owners of the salons or managers).

Table 5 Procedural responses (Problem 4) – a client with thick hair and birthmark on her face

Subject	***Hair cutting procedures***
A1	Reduce weight, straighten it with chemicals, wispy over face
A2	Short, colour soft and wispy over face
F3	Remove hair, leave long pieces, thread it out, break it up
F4	Remove hair, layer it, soften fringe and feather it across face
F5	Reduce hair, quite piecey -- even down over ears, keep it soft and wispy on the perimeter
F6	Keep length, take it shorter at back, keep weight around front of face
C7	Asymmetrical effect, one side shorter than the other
C8	Layer it, not so bushy
C9	Shorter bob, concave at back, longer in front
O10	Short bob -- keep it pretty full
O11	Short bob

These findings support the proposition that the norms and practices of each workplace patterned the kinds of activities individuals' engage in within the salons and that these have cognitive consequences. The observational and survey data in the first phase of the study identified the kinds of practices adopted in each salon that were consonant with these responses. Perhaps such a conclusion might been seen as not surprising. However, it emphasises the situational influences on thinking and acting.

Activities mediated by individuals' ontogenies

Beyond the influence of the cultural practice and situational factors, the contributions to thinking and acting arising from individuals' ontogenies that constitute their cognitive experience were also identified. In the data was evidence of individual agency being enacted in these hairdressing activities and this is reflected in individuals' representation of the responses to the problems. This enactment was often discretionary behaviour within the boundaries of the situational norms for subordinate members of the salon's staff and occasionally transcended by senior workers. However, rather than being inexplicably idiosyncratic, many instances of the decision-making were premised on individuals' personal histories.

Conceptual bases related to individual

The premises for the selection of specific goals in hairdressing were often identified as being linked to events in individuals' histories. Concepts underpinning the goals for transforming a client's hairstyle (Table 6) and responses to a complaint indicated that the selection of the actual goals for hairdressing activities often had individual bases. The first example below demonstrates how the conceptualisation of goals reflected individuals' preferences for particular procedures. As noted, Problem 4 presented the hairdressers with two issues: firstly, the client wanted a change from her long and thick hairstyle; and, secondly, the client had a birthmark on the side of her face, about which she was self-conscious. The responses indicate how individuals' preferences and values influenced the formulation of goals and resulted in the kinds of procedures ultimately selected. As noted above (see Table 5), the appraisal of this 'would-be' client provided common acknowledgement of the amount and bulk of hair, client's face shape/size and the need to consider her birthmark. However, in terms of final goals and solutions, the subjects provided quite different formulations of goals and preferred solutions. Table 6 presents a summary of each of hairdressers' response to this problem. The data presented in the two columns is that which refers to how each hairdresser firstly conceptualised the goals (the left column) and then the selected hairdressing procedures (right column).

The actual goals and procedures for the hair treatments proposed for the client reflected the individual hairdressers' preferences. For example, C7 declared the birthmark to be a problem of the client's self-concept and proceeded to offer a severe cut that would draw attention to the area of the client's concern. This was a wholly unique response. Others emphasised the shape or size of the face (A1, O10) or the shape of the neck (F4) as something they might incorporate in their goal for the cut. The common goal was to soften the appearance around the face and the hairdressers' responses comprised variations of procedures that aimed to leave the birthmark obscured (A2, F3). However, there were variations to this goal as well as how this goal should be achieved. C7's response is indicative of his particular disposition -- a belief about self-concept -- that shaped the formulation of his goal for the haircut. His personal values and beliefs were evident in his views about life and work as ascertained in the first study. For instance, he declared that as Napoleon had made a virtue of his facial birthmark, this woman should too.

Table 6 Formulating goals and selected procedures (Problem 4)

Subj	Conceptualising goals	Selecting procedures
A1	Nice face -- weight of hair	Straighten it with chemicals, then cut it
A2	Curly hair -- difficult to visualise	Short bob - shaped cut
F3	Small face -- lots of hair	Give her a modern look
F4	Beautiful neck -- lots of hair - looks like a carpet	Soften fringe and layer it
F5	Stylish means shorter	Give her a piecey hair cut - long bits coming in front of ear
F6	Curl – length	Cut long hair into style -- reduce length by stages
C7	Self-image -- she should learn to ignore birthmark	An asymmetrical cut, short
C8	She's all hair -- small face for all that hair	Take up length and layer it around her face
C9	Change it -- hold it up	Shorter bob -- reduce bulk
O10	She's got lovely hair -- square face	Shorten and reduce bulk -- feather on to face
O11	Nice and thick -- looks tatty	Bob and curls would look nice

As represented in Table 6, the other responses were different versions of covering up the birthmark. As illustrated below (Table 7), in many instances the hairdressers were able to identify the source of their preference for particular techniques. So, whereas Table 5 illustrates some uniformity of responses to this problem from subjects within settings, Table 6 suggests that, more specifically, the solutions they advanced reflected individuals' preferred goals and procedures within the scope of the problem solutions. The two tables offer different levels of analysis of the same data and provides evidence of different social influences on how the selection of the techniques that the hairdressers adopted were sourced.

Procedures unique to individual

Despite the existence of preferred norms for practice in each salon (*'they way we do things here is ...'),* differences in procedural responses to the same problems were also evident. These again were identified as the exercise of choice within the range of procedures that were favoured in the particular salon. Many of these differences were associated with preferences identified in the interviews and observations in the first phase of the investigation. For instance, in the responses to Problem 2, --- a women with long hair --- F3 emphasised cut, but not colours; F4 emphasised changing the women's appearances; F5's preference for colour and cuts was also evident, as was F6's interest in colours. These types of preference were evident elsewhere. For example, in response to Problem 4, --- the client with thick hair and a birthmark --- A1 proposed straightening the client's natural curly hair with a chemical treatment, A2 suggested a colour solution -- a response also quite idiosyncratic and unusual, given the client's dark hair (Table 7). In Table 7, an elaboration of the analysis to the responses to Problem 2 (see Table 4) is presented. It proposes individuals' selection of solution strategies as options for hairdressing procedures privileged in the particular salon (second column from the left).

Table 7 -Individuals' procedural responses (Problem 2)

Subject	*Procedures (see Table 5)*	*Individual solutions based on personal history*	*Source of solution –in personal histories*
A1	Short bob - hair over face	Short bob -- hair over face -- layer fringe -- copper highlights	Warmer colour, a personal preference.

A2	Short - hair onto face	Short -- hair on to face – perm	Giving volume - a personal preference.
F3	Leave long pieces	Stay long -- volume to get off neck (possibly perm)	Fine hair /old perm lacks body -- like the look of hair up -- preference.
F4	Leave long pieces	Give extraordinary perm (big, small, soft rods, little 'dreads', etc) different textures , interesting pieces of hair	Judgments formed by growing up, being aware, knowing the magazine images).
F5	Shorter - but leave long pieces	Soft into back of neck -- leave long pieces hanging down – 1, 2 or 3 colours	Just from working in trendy salons.
F6	Leave long pieces	Leave some length -- tendrils hanging down -- different slices of colours -- reds, etc	Leave long, so she can put it up - needs colour to cover regrowth (concepts came from seminars and friends).
C7	Short with chemical treatment	Short -- keep some length -- perm (volume) -- layer cut	Problem of her self-concept; to make client feel better, give her a striking haircut.
C8	Short with chemical treatment	Short - above collar bob - semi-perm -- colour for sheen	a product of working in this community, where conservative solutions are prized.
C9	Short with chemical treatment	Body wave or streaks	Unable to participate in validation
O10	Short bob	Short bob -- mouth level	Unable to participate in validation
O11	Short bob	Short bob	Unable to participate in validation

However, the sources of the selected options were often identified as being embedded in the subjects' personal histories (third column from the left). That is, the apparently idiosyncratic responses were frequently identified as products of personal histories. For example, A1's solution of straightening the client's hair with a chemical treatment was attributed to her hairdressing training in the United Kingdom. This practice, although adopted in the temperate climate of Britain, is not usually encouraged in northern Australia, as the dry air, heat and exposure to sunlight and time spent in chlorinated swimming pool water would probably damage the treated hair. So this proposed solution is attributable to the hairdresser's personal history as a viable option available in her repertoire of solution options, but not in those of others. A2's solution was linked to her personal aesthetic preference. F5 disliked chemical treatment arising from a health-related incident and subsequent concern about the effects of these treatments, after he inadvertently inhaled some. His preferred procedures and options for clients emphasised alternatives to and options for shaping hair. The analyses of task solutions also revealed preferences for techniques. F6's interest in colour is reflected in here solution, as is C7's beliefs about facing up to one's shortcomings.

From these findings, it is proposed that sociocultural and situational factors shape the kinds of goal-directed activities that individuals engage in, how they conceptualise the overall problem and the range of procedural option they can deploy. However, the selection of hairdressing activities is also mediated by individuals' personal history and exercised by their agency. The findings provided some evidence that the conceptualisation of goals and procedures was identified as being unique, or almost unique, to subjects, with the geneses of these preferences often being locatable in their personal histories. Therefore, these responses were not just idiosyncratic: they were the product of individuals' unique ontogenetic development that arose from engagement with the social world, and are a product of the exercise individuals' agentic action when engaged in goal-directed activities in a social practice.

Sociogeneses, activities and ontogeny

The findings serve to support the theoretical propositions advanced early in the paper. Different social sources of knowledge were identified as contributing microgentically to the hairdressers' development. These sources comprised the sociocultural and situational bases of the knowledge to be learnt and the ontogenetic contributions that arise through personal histories. These, respectively, are taken as instances of the social and cognitive experience (Valsiner & van de Veer 2000). Moreover, particular contributions to the engagement in goal-directed activities were able to be associated with each of these social sources. Segments of verbal data from problem-solving protocols and ethnographic-type data were used to identify the three different sources of knowledge and their particular contributions. Associations between phases of goal-directed activities and sociogenetic elements were identified. This suggests not only multiple sociogenetic contributions, but that each contribution influences individuals' knowledge construction and, hence, cognitive development in particular ways. Table 8 draws together these contributions. Of particular interest was the identification of how events in personal histories shaped individual hairdressers' responses (e.g. engagement, choice, enactment) to goal directed activities. Rather than being inexplicably idiosyncratic, these responses where identified as the product of the intersection between the evolving social practices individuals engaged in and their ontogenies. These findings are now elaborated and discussed.

The sociocultural contribution to knowledge

The investigation identified representations of concepts and procedures that were common across the four settings. These were validated by subjects as likely to be common across hairdressing settings that are typical of the two countries in which the empirical investigation was conducted. As such they are taken as being the product of historical and cultural geneses. Concepts ranging from strategic goals to specific concepts were identified as being common to the four sites (see Table 8). Common procedures including strategic problem-solving and specific procedures aimed at securing particular goals were identified. Commonality in some procedures was associated with the historically-derived human-service orientation of hairdressing, as these procedures are not peculiar to hairdressing. For instance, negotiations between clients and hairdressers to understand client needs are interpreted as sociohistorical or phylogenetic procedures. These procedures and concepts are not unique to hairdressing. They are common to a number of sociocultural practices, thereby reflecting phylogenetic development as a social concept, in keeping with Vygotsky's intention (Scribner 1985). That is, they are a social product that is sourced and exercised in a range of sociocultural practices.

Yet, at the phylogenetic level these concepts and practices are abstracted from particular sociocultural practice. To understand, for instance, what constitutes (i.e. concepts) and how to achieve (i.e. procedures) client satisfaction there is a need to account for the sociocultural line of development -- the practice of hairdressing. It is proposed that sociocultural (vocational) conceptual tools, act to

formulate the overall goals, sub-goals and some specific aspects of the hairdressing task (see Table 8). From the data, the sociocultural contributions appear to be associated with the goals associated with the practice of hairdressing and bases by which the objects of practice (clients) can be considered and categorised. Procedures identified as being sociocultural are those that might be thought of as canonical to hairdressing practice that have evolved and been proven over time. These included the overall approach to hairdressing as well as specific techniques and solutions strategies. Their contributions to the enactment of goal-directed activities and hence, development, are to provide goals and concepts as well as strategic and specific procedures by which this culturally-derived task can proceed.

Table 8 Sociogenetic elements contributions to goal-directed activities

Source	*Concepts*	*Procedures*
Socio-cultural	(i) Strategic goal (e.g. client satisfaction) (ii) Sub-goals (e.g. management of hair) (iii) Common basis for client conceptualisation (e.g. face shape, client type) Interpreted as: (a) Common goals for hairdressing (b) Common conceptualisation of problem space	(i) Common procedure for securing goals (e.g. determine, negotiate & monitor) (ii) More specific procedures (e.g. responses to customer complaint) (iii) Securing specific goals (e.g. shorten long hair) Interpreted as: Broadly consistent approaches to securing goals
Situational factors	(i) Conceptual basis for goals & sub-goals: • formulating strategic goals (e.g. at C - maintaining standing of salon) • determining 'how far can you go' (e.g. at A – client's ability to manage cut) • in consultation and treatment (e.g. at A - determine lifestyle) Interpreted as: Establishing parameters of problem space (defining potential range of solutions)	(i) particular procedures privileged (e.g. Cut, Colour, Trim or Chemical) (ii) emphasis on particular procedures (e.g. long threaded types of cut at F) interpreted as: delineating alternative solution operators
Individuals' Histories	(i) Conceptualisation of sub-goals (e.g. small face / nice face) (ii) Concerns about self (e.g. what did I do wrong? Interpreted as: Constructing problem space & selection of preferred solution	Preference for particular procedures (e.g. F3 doesn't like colours) Interpreted as: Securing goals selected from problem space using particular procedures

As the subjects had constructed their hairdressing knowledge in different settings and, for some, combinations of settings, in sites that were geographically remote from one another, commonality in their representations suggests that historically derived sociocultural forms of knowledge are common to and accessible in the circumstances where the sociocultural practice of hairdressing is enacted. This suggests that historical and sociocultural legacies are embedded in the activities in which these individuals engaged in their vocational practice. The findings also suggest that the sociocultural and historical contributions are more evident in some parts of the goal-directed activities than in others. In some ways, these findings support Vygotsky's goal of transforming phylogenesis from a biological to a social concept (Scribner, 1985). By identifying how cognitive

change is shaped by engagement in activities that have situational, cultural and historical geneses the case is more readily supported for a social basis of change during ontogeny. Certainly, across the lifespan, interactions between ontogeny and history together offer an explanatory principle for human development. That is, changes in tasks, technologies and artefacts provide a platform upon which human development is exercised and mediated.

Nevertheless, these findings are not used to propose cultural needs nor the concept of sociocultural practice as being unitary, nor crisply defined and well differentiated. They suggest instead the bases for a further level of analysis. There are variations within sociocultural practices that render them as being quite distinct from what might be taken as typical practices. For instance, not far from the one of the hairdressing salons is another salon that specialises in Rastafarian-style hairdressing and beaded hairstyles that have their origins in Africa. This vocational practice employs practices, technologies and norms and has a clientele that are distinct from nearby hairdressing salons. So this specialist salon reflects a distinct sociocultural need, as do barbers' shops. However, not too far from these two salons, are also those in 'China-town', where the capacity to speak Cantonese is essential and where the treatments are mainly for clients with dark straight hair. This salon shares many of the goals, techniques, and processes with the four salons that were the focus of the study. However, they have practices that render them culturally distinct. If pushed, the hairdressers in the other salons might be able to practice in each others' salons. However, they might find some of the requirements for working in the salon in 'China-town' or the Rastafarian salon as being too culturally dissonant. So whereas the four salons in referred to in this study reflect a cultural need, there are others that embody distinct version of the sociocultural practices of hairdressing (e.g. barbers and Rastafarian hairdressers). So these categories of sociocultural practices are not intended to be wholly distinct and exclusive. Instead, they represent a basis for understanding a level of development that reflects particular cultural need and represents a particular line of development, which can be used as an analytical and as a procedural tool, for the development of vocational curriculum and the identification of the complex requirements of vocational competence.

Situational contributions

Beyond sociocultural practice and its variations are the situational contributions that constitute how the practice is enacted in a particular social and physical space. Particular procedures and concepts were identified as being peculiar to and privileged in each hairdressing salon. This finding furnishes evidence of how situational factors shape the kinds of goal-directed activities conducted in each salon and the activities individuals engaged in and from which they learnt (Table 8). In particular, goals for hairdressing aligned with the continuity of the workplace (i.e. social practice) including responding to its clients' needs with appropriate goals for and methods of hairdressing are manifested as practices privileged by the particular salon. So the range of solutions or goals permissible within the work practice that comprises the norms and practices of the salon ('what we do here is ...'), are a product of the micro-social processes that shape its practice. The goals and rules associated with the sociocultural

knowledge of hairdressing inform the overall goal for the activity. However, the parameters for individuals' overall goal formation and approaches are shaped by situational factors.

The privileging of particular goals and techniques or specific procedures was evident in each setting, and were identified in the first phase of the investigation, with the norms and practices of each salon being a product of its activity system (e.g. Engestrom, 1993). Concepts underpinning normative decisions were reported as being specific to particular salons and negotiated situationally. Different norms sat behind the negotiations of haircutting goals in each salon. The norms arising from situational factors (i.e. their activity systems) were also evident in the formation of goals and the practices being adopted. Consequently, although common (sociocultural) goals are evident across the four settings, how these goals are constituted, conceptualised, negotiated and secured in each setting is the product of micro-social processes comprising their local ordering and negotiations. Participation in the social practice is also likely to led to a degree of intersubjectity or shared understanding that arises from proximal and collaborative interactions (Newman, Griffin & Cole 1989).

From a cognitive view, these findings suggest that the 'problem space' (Newell & Simon, 1972) or representation of the problem, which individuals construct, are shaped in part by the norms and practices of the setting. That is, there are options about how to conceptualise and proceed with the hairdressing task in each salon (i.e. – 'what we do here is ...'). These norms and practices constrain the 'problem-space' or range of options likely to be accepted in the setting. In their responses to the hairdressing problems, owner-managers, whose standing allowed them to contravene the salon's norms and practice, appeared more likely to advance solutions that were outside of accepted practice. Other hairdressers exercised discretion within the scope of options that comprised the norms of the practice. Each salon's local orderings (Suchman, 1996) provided a basis for the kinds of activities to be undertaken and privileged how they were to be undertaken (preferred procedures) and by whom. They constituted what are taken as acceptable goals for practice. In short, situational factors shape how the instance of the sociocultural practice of hairdressing is constituted in actual practice by establishing the goals for and privileging of particular means of acting to realise those goals (Billett, 2001a). Therefore, the kinds of activities and, hence, cognitive change individuals are able to realise microgenetically are dependent upon the kinds of affordances that workplace provides in terms of opportunities to engage and be guided both proximally and distally by the workplace (Billett 2001b). Nevertheless, the findings also indicate that this micro-genetic development was also mediated by individuals' ontogenies. That is, the inter-psychological processes are also shaped by individuals' personal histories.

The ontogenetic contributions

Responses unique to individuals were also represented in the data. Despite there being situational requirements for how activities were to proceed, the evidence suggests that hairdressers' preferred goals and procedures were deployed when opportunities arose for the exercise of personal preferences. These preferences are sourced ontogentically. As noted, the exercise of discretion was in part

associated with the individual's standing in the salon and their potential to negotiate goals. That is, those who were principal participants (e.g. owners and managers) were able to exercise their discretion more broadly. However, this merely reflected the degree of the exercise of discretion. Picking up the point from above, their problem space was less constrained. Engagement in these activities has consequences beyond the successful completion of tasks. They are associated with microgentically reinforcing, refining and extending individuals' knowledge through inter-psychological processes. Therefore, the engagement in goal-directed activities in particular situations and its mediation by individuals' ontogenies provide bases by which to understand the relations between the social and cognitive contributions to thinking and acting. In Table 8 it is suggested that ontogenetic factors shape how a task and task element is conceptualised, how the individual responds to the task or object and the choice and exercise of an enacted response. In this way, these factors shape the problem space and the selection of responses are a product of ontogenetic factors.

The bases for many of the responses were identified through interviews as being the product of their personal histories. The hairdressers were often able to identify and explain their preferences through recounting of their interpretations of incidents (e.g. where they had been apprenticed, worked, gone to college, experiences at work etc.), sources of expectations (e.g. trendy salons, other salons, friends, etc.) and artefacts (e.g. magazines, streets, styles, etc.). These responses are held to be products of individuals' construction of knowledge arising through the experiences that constitute their unique ontogenetic development (Billett, 1997). Personal preferences resulted in the hairdressers' selection of particular techniques or procedures, thereby privileging the kinds of task they engage in, how they engage in those tasks with consequences for their development. As noted, there are a range of goals and procedures privileged in each salon. Yet the selection of particular goals and procedures from the available options was shaped by individuals' ontogenies, which included the exercise of their personal agency. In the interviews, the hairdressers described their interests in their vocation, including their current employment. A number reported deliberately seeking out their current employment because of a preference for a particular kind of vocational practice. Their choice of vocation - and, for some, where they practised - was the product of personal aspirations, agency and subjectivity. Moreover, they were also often agentic in securing these goals. Some were able to be discriminating in the kinds of work they engaged in and actively pursued preferred kinds of employment. So individuals' agency can be seen as mediating the kinds of goals that they adopt for their vocational practice as well as preferred means of securing these goals. This emphasises the agentic role of ontogentically derived learning when engaged in social practices, such as these workplaces. The findings suggest that the hairdressers' socially derived preferences were influential in the goal formation for the hair treatment and selection of procedures, upholding the proposition that mediation and appropriation of knowledge as a reciprocal (e.g. Lawrence & Valsiner, 1993; Valsiner, 1994) negotiated (e.g. Rogoff, 1995) and contested process (e.g. Wertsch, 1998). Ontogenetic development is reciprocally, yet individually socially mediated, and likely directed towards the maintaining the viability of individuals' ontogenetic goals rather than being a process of mere

socialisation or situational determination (Billett 2002). Importantly, this viability is likely to be secured in terms of individuals' socially derived knowledge. Development on the ontogenetic plane is held to provide the bases for constituting this viability.

In this way, relations are proposed between culture and cognition that are played out in complex ways, including the accentuating of the contributions of different sociogenesis elements to the shaping of activities, goals and bases by which individuals engage with the social experience. Consideration of these may assist locating a path between the "twin hazards" of individual constructivism and social determinism (Miller & Goodnow, 1995). The data also question the belief that knowledge realised through participation in everyday activities is somehow more fragile that developed in educational settings (e.g. Ericsson & Lehmann, 1996). It seems that robust sociocultural and sociohistorical knowledge is accessible in these workplace settings through engagement in sociocultural practices. However, just as in educational institutions, this knowledge is constituted in particular ways according to the goals and procedures that are privileged in those settings.

Summary

As the sociogenesis of knowledge in vocational practices has not previously been empirically researched, further evidence is needed to understand more fully the complex relations within the sociogenetic process and how they impact upon learning across the lifespan. Among these are how variation in sociocultural practices are manifested and are in turn shaped by situational factors, and engaged with by individuals. The extent of the patterning that emerged in the data analysis between the sociogenetic elements and phases of goal-directed activity were unanticipated. Perhaps these kinds of findings will not be sustained in other instances of social practices where individuals are not as closely bound by physical circumstances (i.e. close working relationships). These instances may fail t provide the bases for intersubjectivities of the kinds identified in the hairdressing salons. Different findings might arise from situations that lack the kinds of local negotiations and orderings, and close interactions of these four workplaces. For instance, workers operating in geographical or physical isolation will unlikely develop the level of intersubjectivity identified above. However, it is anticipated that future studies would generally support the findings of the different sources and contributions of sociogenetic processes identified here.

In sum, this paper potentially advances the empirical bases of sociocultural theory and the sociogeneses of knowledge. A complex of sociogenetic contributions influences thinking and acting. Evidence has been advanced of the cognitive consequences of participating in social practices that afford proximal guidance and other opportunities for intersubjectivities. Negotiations between situational contributions and personal histories meditate these consequences. Therefore, deliberations about sociogenesis need to include considerations of history, culture, situations and ontogenies and the relations among them. Importantly, the above discussion identifies ways in which the contributions of and relations among history, culture and situations, as well as ontogenies, might be understood more fully.

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