Systems Resemblance and Workpractice Evolution: Implications for Work Activity (Re)design

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Abstract

This paper is concerned with addressing the question of how apparently disparate and unconnected systems can resemble each other. The question of what counts as a systems resemblance necessitates developing contextual workpractice descriptions associated with the systems features and ultimately entire systems. Using systemic semiotics an apparent ontogenetic convergence between entirely different systems is used to show that systems resemblance can be inferred when the constituent workpractices of information systems consist of comparable register features and especially if they exhibit comparable generic features. The implications of these findings for a new class of work activity (re)design practices are considered.

Keywords: Workpractice, Activity, Design, Semiotics, Organisations

1 Introduction

During a recent student consultation, one of my final year BSc students was describing the system he was studying for his major assignment in an advanced methods course. The described workpractices belonged to an end-user developed, transaction-oriented, operational level information system located only three floors away from my office at Staffordshire University, United Kingdom. But these workpractices bore an uncanny resemblance to workpractices that belong to a set of related systems developed at The University of Wollongong in Australia. This kind of occurrence raises immediate questions. The first questions involve *systems resemblance*. How can we determine if two information systems are similar to each other? Related to this is the question of which level or levels of granularity (individual workpractices or complete systems) does this similarity reside? If we consider transaction-oriented, operational level systems to be made up of sets of related workpractices then systems resemblance requires that the existence of comparable workpractices be first established before an assessment of the similarities and differences between these systems can be made.

The second question involves *workpractice evolution*. Information systems will change structurally and functionally over time as a consequence of changes to their constituent workpractices. Moreover, given that there are likely to be many ways in which the same kind of functions could be realised structurally, it is difficult to understand how systems can resemble each other at all. What makes any resemblance between information systems even more remarkable is that it will be the consequence of two distinctly different diachronic processes, so what might seem from a structural and functional perspective to be static similarity in fact appears to be a dynamic *ontogenetic convergence* between these systems. Within traditional information systems literature, functional and structural changes to systems

are construed in terms of the system product as a material artefact of development practices. The emphasis is not in identifying the diachronic processes responsible for systems change, or on understanding how these processes influence systems over time. Traditional approaches, informed by acontextual process models of communication, proceed by reifying the system and then attempting to identify what functionality is needed in order to identify and replace new system structure for old. This reification and the problems it creates in trying to understand the development and maintenance of systems is particularly evident in the application of metrics to software engineering performance for example (see Fowler 2003 for a brief but excellent discussion), software measurement metrics (size- for example constructive cost models or COCOMOs- see Olsen 2004; function, and extended function point metrics) as well as metrics for software quality, software process improvement, and other project metrics (see Pressman 2000 for a depressingly extensive overview). The very existence of an apparent system convergence is suggestive of the type of theoretical approach that should be adopted here; one in which diachronic processes can be identified, described and contextually related to system change.

In this paper we will describe an approach that will help us theorise how it is possible for systems to resemble each other when to all intents and purposes there appears to be no apparent connections between them. In order to understand how two entirely different systems can evolve independently and yet resemble each other we need to understand how to describe systems in relation to the organisational contexts in which they reside and evolve. In §2 we address these questions using a contextual and semiotic theory of communication called Systemic Functional Linguistics (Halliday 1985; Hasan 1985; Martin 1992; Mathiesson 1995). Relevant methods are described in §3 and applied to comparable workpractices in their respective systems in §4. The resulting illustrative and comparative analysis enables us to identify in what respects the resemblance between systems can be established.

The existence of systems resemblance begs a more fundamental question of how does one actually *recognise* these similarities in the first instance. *Recognition* is central to understanding how particular social subjects- for example users- know how to negotiate particular workpractices associated with an information system. This same recognition is also central for another class of social subjects- computing students, IS academics and systems analysts for example- who are interested in studying systems. Despite the fact that no appropriate approaches seem to exist within traditional information systems to explain this recognition, there is no doubt that these social subjects could recognise that the systems considered here are similar to each other. Explaining the process of recognition for all social subjects involves using concepts from Social Semiotics, introduced in §2. Several consequences are apparent for design practices. These are considered in §5. Concluding remarks are provided in §6.

2 Contextual and Semiotic Theory

2.1 Communication and Meaning

Adopting a human communicative perspective to the study of information systems does seem at odds with the prevailing traditions in information systems and computing science particularly if one views development from the perspective of programming. Although not easy and while rarely attempted, programming can be studied from a communicative perspective. For example, Andersen and Kyng (1988) correctly identify that not only are programming languages used for instructing computers but they are also used for

communication between humans. In searching for an appropriate theoretical foundation for object-oriented programming, Madsen (1996) advocates the use of semiotics as a way of understanding the diversity of the domains involved for a given application- the context of use, the user interface, and the program itself. However, theories of human communication are crucial in formulating adequate accounts of how technology works in organisations- this is where a human communication perspective is most obviously relevant. While there are a number of different linguistic paradigms (Sampson 1980) only some are applicable to information systems and computing science including the *generative paradigm* viewing language as string manipulation, the *logical paradigm* viewing language as reasoning, and the *european structuralist paradigm* which views language as the creation of meaning (Andersen 1990). From this last paradigm, we select *systemic functional linguistics* (SFL) as a foundation for our framework because it is explicitly a social semiotic model of language (Halliday 1978, 1985).

From a social semiotic perspective everything that has cultural significance enters into communication in the sense adopted here. This includes such things as identified attributes, social relationships, individual feelings, the social positioning of the sender and the receiver, as well as things that would normally be thought of as information including statements about the physical and social world. In contrast to traditional acontextual process models of communication, the 'consumers' of communication are considered to be as active as the 'producers'. This is necessarily so because meaning is not to be found 'in' the communication itself but rather is a consequence of interpretative meaning making processes conducted against a changing social milieu. Following Kress (1988), communication is never simply about individuals expressing their meanings, because individuals in communication- so-called *social subjects*- are socially and culturally constructed and draw upon 'ways of meaning' already available to them by virtue of their membership to various social groups and cultures. Nor is communication about 'sharing meaning' or indeed even the 'mutual construction of meaning'. Societies and work organisations consist of multiplicities of social and cultural groupings and therefore communication between and across these groupings will, as likely as not, involve *contradiction* and *contestation*. Moreover given our different social, economic, historical, and institutional experiences, not to mention differences in age, ethnicity, class and gender, the processes of communication are likely to be based on *differences* and attempts at resolving differences. As will be described more fully in §3, the view of meaning adopted here is one that is defined in terms of its observable context. In specific acts of communication, we come to understand what is 'meant' through a process of *selective contextualisation* (Lemke 1994). We restrict what a sign, letter, word, or sentence can possibly mean using conventions of relevance, selecting some contexts over others in order to interpret it in such a way as to make it recognisable for members of some discourse community.

2.2 Texts and Workpractices

The basic unit of communication used here is the *text* "... a completed act of communication, in any medium..." (Kress 1988, 185). While systemic functional linguistics recognises that spoken and written language are different kinds of language- in that they utilising different linguistic resources- all texts are both products and processes. A text is a *product* in the sense that it is an output or an object and as a consequence all texts have an analysable structure. While it is obvious that written language products are *documents*, it is not immediately apparent that spoken language is also a product. Yet in order to analyse spoken language we need to transform it into a *transcript*, like the sample texts in Figure 3 (a) and (b) that employ the CHAT standard (MacWhinney 2003). A text is also a *process* in that it is interactive and

social. While it appears reasonable to consider spoken language applied to *bread buying*, *bill payment*, or *course enrolment*, as interactive and social, it is not immediately obvious that written language is also interactive and social. But this does follow from the previous discussion in §2.1.

If we take as an example *buying bread* from a shop, the actual completed act of communication I engage in with the vendor is a text- its an interactive social event and as it will have been recorded and transcribed, it is also a product with an analysable structure. If I were to repeat this process for many customers in the bread shop I would end up with transcripts which would, conceptually at least, cover most of the ways in which people could possibly buy bread. In other words I would have a set of records that described how the work of *buying bread* is done. Under the assumption that we could describe in one economical representation, the diversity of linguistic realisations associated with bread buying work, then the resulting text type together with any required material actions could be referred to as a work pattern or *workpractice*. Indeed operationally we define a workpractice as consisting of one or more text types and zero or more action types.

2.3 Systemic Semiotic Workpractice Model

In §2.1 we introduced two related theories Social Semiotics and Systemic Functional Linguistics. In the remainder of this paper we will use the received term *systemic semiotics* to refer to the combination of these theories. In this section we describe the *Systemic Semiotic Workpractice Framework* (Clarke 2000, 2001a, 2002, 2003) which can be used to study workpractices as defined in §2.2. The framework provides mappings between related but distinct concepts from these constituent theories- but we limit our discussions to only a few relevant mappings. For further exposition and a complete set of mappings refer to Clarke (2000, 2001a). Some of these mappings are relatively easy to establish as they involve the derivation of various *strata* within the model of Systemic Functional Linguistics itself- we will describe these first.

The model of Systemic Functional Linguistics that is used here is called the stratal model (Martin 1992). It is a modular reorganisation of Michael Halliday's (1985, 1978) grammar into strata responsible for specific types of language and contextual features. In a number of cases, the language resources are redefined in order to achieve a better match to strata (see Martin 1992). The stratal SFL model has useful properties; for a given study appropriate linguistic methods can be determined in advance. As emphasised in §1, we need to use contextual theories. In Figure 1 (a) we employ the convention of illustrating strata as nested concentric ovals to show 'text' as existing within a 'context'. The relationship between text and context is dynamic and complex as suggested by the dark vertical arrow. In Figure 1 (b) we see context separated into two distinct strata- a 'situational context' and a 'cultural context'- following the pioneering work of anthropologist Bronislaw Malinoski (1923). This enables us to understand that there is a context involving the immediate situation, which exists within a broader cultural context that makes the situational context relevant. We also relabel 'text' in Figure 1 (b) to 'language' in order be specify the kind of text we are interested in analysing. In Figure 1 (c), technical labels are provided for these contextual strata- the situational context is referred to as *Register*, and the culture context is referred to as *Genre*. As both strata are central to our study of systems resemblance systemic functional linguistic methods for recovering contextual features from workpractices texts are described in §3.

Following Eggins (1994), language is considered to be a tristratal system- see Figure 1 (d) consisting of meanings (Discourse Semantics) which are realised by wordings (Lexico-grammar) which are in turn realised in either speech (Phonology) or writing (Graphology). A relatively complete stratal model is provided in Figure 1 (e).

The dynamic view of communication based primarily on the work of Bakhtin (see Todorov 1984) relates social subjects to texts via the operation of *discourses*. Discourses are defined as "systematically-organised sets of statements which give expression to the meanings and values of an institution. Beyond that they define, describe and delimit what it is possible to say and not possible to say (and by extension- what it is possible to do or not to do) with respect to the area of concern of that institition, whether centrally or marginally…" (Kress 1985, 6-7). Social subjects are positioned in relation to particular discourses negotiated in texts and will tend to assume already available 'roles' or *subject positions* with respect to them. Texts address and position social subjects by constructing a dominant *reading position* that instructs the social subject "… about who, what and how to be in a given social situation, occasion, interaction" (Kress 1985, 39). In complying with the dominant reading position established in a text, a social subject is said to be a *compliant subject*- they are positioned by the text to be oblivious to the contradictions within it. Alternatively a social subject may choose to contest the reading position in which case they are referred to as a *resisting subject*. A student (compliant subject) undertaking a loan (text) may not see any contradiction in paying a deposit for borrowing software from a help desk (adopting the dominant reading position) when in fact they do not need to do this when borrowing books from the library. Alternatively, it is possible for a student (resisting subject) to renegotiate the terms of a software loan (adopting an alternative subject position) which enables a valuable object to be substituted for an otherwise compulsory identification card (Clarke 1996). We can draw several theoretical affinities between concepts in Social Semiotics and the SFL stratal modal. The affinities that are relevant here are between texts and language, social subjects and tenor (social role relations), and conventions, used to assist social subjects in negotiating the reading position of a text, and genre.

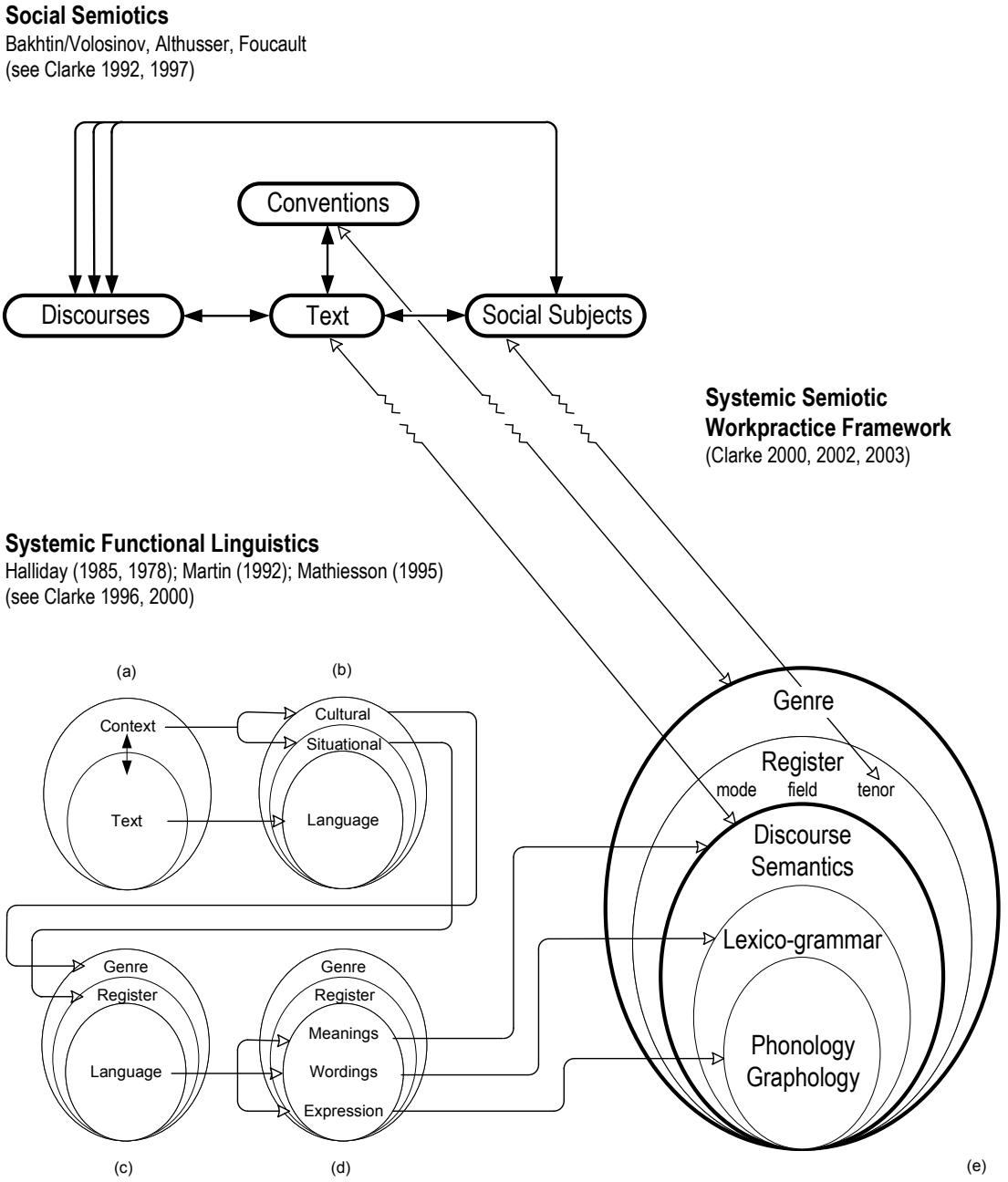


Figure 1: Systemic Semiotic Workpractice Model (after Clarke 2000) and its constituent theories Social Semiotics (upper) and Systemic Functional Linguistics (lower). Following Eggins (1994), the derivation of the strata in the Stratal Model of SFL (after Martin 1992) is shown in (a) to (d) inclusive, while a simplified final form is shown in (e). Theoretical affinities between concepts form part of model (Clarke 2002, 2003) however not all are shown here; refer to the text.

3 Relevant methods

In this section we describe the register (§3.1) and genre methods (§3.2) that are used to examine representative texts for the systems whose degree of resemblance we are interested in determining in §4. These information systems are operational level transaction based systems and so we limit our study to spoken language texts that characterise their workpractices.

3.1 Register Methods

Whether speech or writing, texts always include some aspects of the situation. This is necessary in order to assist in make a text understandable. Systemic-functional linguistics recognises three aspects of the Context of Situation which collectively form the Register of the text. These aspects are called *field*, *tenor* and *mode*.

Field describes the *social activities and actions* that are taking place, what Eggins (1994, 9) describes as "the topic or focus of the activity". We know what's going on mainly from *lexical items* or words, specifically nouns and noun groups that are used. But as most words have many usages, we need to identify the so-called *indexical lexical* items that characterise the activities for given stakeholder groups in particular social situations. Experience gathered by analysing multiple texts of the same type of work will yield a number of indexical lexical items that can be represented in a *system network* like those in Figure 2 (described in more detail in §4).

Tenor describes the social *role relationships* played by interactants. Examples include dyads like student/lecturer, customer/salesperson, or friend/friend. Three continua are used in Martin's (1992) stratal model of Systemic Functional Linguistics to determine the tenor of a text. The *power continuum* is used to classify situations according to whether the roles we are playing are those in which we have equal or unequal power. The *contact continuum* is used to classify situations by whether the roles we are playing bring us into frequent or occasional contact. While *affective involvement* is used to classify situations according to whether the roles we are playing bring us into high or low affective involvement (high or low emotional levels).

One of the limitations of 'role' or 'social role' is that it is a static concept. Once a role is assumed it is generally considered to be fixed for the duration of an interaction, and this ignores the ability of social subjects to resist and renegotiate their positioning as described in §2.3. One of the reasons for developing a systemic semiotic approach to the study of organisations, rather than an exclusive systemic functional one, is to get around some of these issues by making tenor relations more dynamic; allowing social subjects to renegotiation the 'social role straight jacket'. This is necessary move in order to account for the actual enactment of workpractices evident when real social subjects are engaged in work semiosis. A consequence of adopting this theoretical stance is that it provides an explanation for work literacies we clearly possess, as well as explaining how we might acquire them, use them and change them. The ability to already know the social role you are expected to play in a given social occasion is based on familiarity with the dominant reading position from a larger range of already available subject postions discursively constructed in texts including those associated with workpractices. This is the theoretical affinity, shown by the diagonal line in Figure 1, between social subjects (Social Semiotics) and tenor relations (Systemic Functional Linguistics).

Mode describes the way language itself plays a part in a given social occasion. Two continua are used to describe it. The *spatial/interpersonal distance* is a continuum based on the possibilities of immediate feedback between interactants. At one end, we would have casual conversation between friends. This is a situation in which visual and aural contact and feedback will be immediate. At the other end of this continuum is a situation in which there is no visual and aural contact between writer and reader(s), no possibility of immediate feedback, and little or no possibility of any feedback. The *experiential distance* is a continuum in which situations are positioned according to the distance between language and the social process. At one extreme- moving a bed up a staircase- language is accompanying the social process. This is a view of *language as action*. At the other extreme- reading a book- language constituting the social process. This is a view of *language as reflection*.

3.2 Genre Methods

For the most part, specific kinds of goal-oriented work will have predictable staging. When we record and transcribe the language accompanying this work we notice that it too possesses a commensurate functional staging. Associated with the (national or organisational) cultural context in which the completed act of communication takes place, this staging forms an important part of global rhetorical organisation of a work text and is referred to as its *genre*. This staging forms an important set of conventions that assist social subjects in understanding the kind of social situation in which they are engaged. This is the reason for establishing a theoretical affinity between the 'conventions' category of Social Semiotics and the 'genre' category of SFL in the systemic semiotic workpractice model, see Figure 1. Genre is associated with the cultural context in which a completed act of communication takes place. The constitutent functional stages of a genre are referred to as *genre elements*. These are negotiated entities in that they have a conditional probability of occurrence (Clarke 1996). This means that an individual genre has the possibility of being renegotiated by social subjects (as resisting subject) into a different structural form. However in practice, most work related genres are generally stable and persistent (Clarke 1996). Recovering the various types of functional staging that represent the diversity of ways in which a workpractice may be enacted, requires the transcription and analysis of a number of texts. Each text will exhibit a particular configuration of elements. Most of these *genre sequences* will have the same elements in the same order. This shows that there is a typical staging to the work. However, some texts will exhibit a different arrangement of elements. In order to be able to show the diversity of ways in which work can be enacted in a workpractice, these individual genre sequences are merged to form a single *genre digraph* like those shown in Figure 4 (described in §4). A genre digraph forms the economical representation of work pattern sought in §2.2.

Like everything is SFL, linguistic resources form systems available to language users (and these can be represented in system network like those in Figure 2 which are also described in §4). Part of the strength of the stratal model is that genre can also be thought of as a system. This opens up the possibility of reconsidering the category of genre itself, moving away from a view of genres as single entities, to enable us to consider higher levels of generic organisation. This is exactly what is needed for thinking about information technologies and systems. Information systems have the characteristic of being *multigeneric* by definition. Higher order generic features have been described in detail (see Clarke 1996, 2000, 2001, 2002). Part of the way we know how to act and interact in work settings that include information technologies, is through the constant repetition of reading positions created with the assistance of consistent generic conventions.

4 Systems Resemblance: Illustrative Comparative Analysis

In this section we characterise and analyse the systems which are believed to resemble each other. In §4.1, we introduce system networks as a notation for displaying the range of options and their interrelationships that are available to social subjects who are involved in using information systems. Determining systems resemblance requires selecting comparable workpractices in each of the systems to be compared. In §4.2 selecting the student loan workpractice which is available in both systems, and by using illustrative transcripts (one for each system), we provide an analysis of their generic and register features.

4.1 Description of the Systems

The systems bearing the resemblances are (i) an operational system established to primarily loan and return software, hardware and manuals to students, tutors and academic staff at the Microcomputer Laboratories, The University of Wollongong in Australia, and (ii) the IS Services Help Desk functions at Staffordshire University, United Kingdom. In fact the former system is one of a series of systems developed by its end users since the mid-1980s and its computer-based services are similar to a previous system called the Manual System. These will be considered as almost the same system from the point of view of loaning and returning (see Clarke 1994 for a more detailed description of these systems).

The broad functionality of these two systems is illustrated in Figure 2 in the form of a systems networks. System networks are taxonomic structures which can show a range of available options organised from the most general on the left hand side of the diagram, the so-called point of entry to the network, through to the most specific options on the right hand side. They can be used to represent the indexical lexical items that represent knowledge about a workpractice, but more commonly they are used in SFL to represent the options available within language systems (we will return to this point in §5.3). By way of introducing the graphical conventions of system networks, Figure 2 (b) shows a subsystem labeled 'software' indicated by the bracket containing the set of options 'administrative' through to 'wordprocessor/text editors'. These are logical OR options; for a give traversal through this network only one of the options in this subsystem can be selected. None of the options in the 'software' subsystem are available if any other selection is made from the 'item' subsystem. Note that 'item' and 'users' are themselves options. In this case the brace indicates that they are logical AND options of the loan/return subsystem; for a given traversal through this network a selection must be made from both the 'item' and 'users' subsystems. Alternatively it is possible that no loan or return will be selected in which case it could be either a 'move' or a 'booking'.

Figure 2 reveals that ALABS is a much more elaborate system functionally- as evidenced by the existence in ALABS of 'item' and 'users' susbsystems- and yet from a systemic semiotic perspective parallels can be drawn between these systems. Specifically we concentrate on the elaboration of the loan and return worpractice as this is a comparable workpractice across these systems.

4.2 Contextual Similarities

In order to do this we examine multiple texts associated with these workpractices, analysing them for register and genre features as described in §3. Illustrative transcripts from both systems are provided in the CHAT format. An asterix followed by a three letter code indicates a turn is being taken, the % indicates coding associated with that turn (%exp is an explanation, %act is an action; %sit is a situation). The information at the beginning of these

transcripts preceded by an @ are constant headings whose meaning does not change throughout the transcript, refer to MacWhinney (2003) for further details of this standard. Figure 3 (a) shows a sample transcript for a student loan undertaken with ALABS, while Figure 3 (b) shows a sample transcript for the comparable workpractice at the IT Services Help Desk. A non-standard modification to these transcripts is the provision of lexical items (underlined) that signal the field evident in these transcripts. The single indexical lexical item in the ALABS transcript is the name of the software being requested. Software can only be loaned or returned in this workpractice so the mention of its name signals the appropriate workpractice. In the IS Services Help desk, a more casual conversational tone is adopted and this indicates that the student is unsure of the procedure- one that they appear not to have done before. The brevity of the ALABS transcript signals the familiarity that the student has with the workpractice- the student was also an overseas student and so adopting a casual conversational tone may have only served to interfere with the enactment of this workpractice. In Figure 3 (c) we see that the registral features are entirely the same for these workpractices. This is the first evidence we have that systems resemblance is the function of similar social actions and activities, social role relations and similar language mode.

What perhaps is even more striking is the fact that these workpractices are virtually identical in the gross details of their staging. In actual fact when compared to the ALABS workpractice, the genre digraph of the Student Loan at Staffordshire University was missing only a short enrolment subsequence and a single repeated genre element. When compared to a workpractice in a predecessor system to ALABS, called the Manual System (see Clarke 2004), the IT Service Help Desk workpractice differed only in the function of one element (in the former system a Student ID card is retained, in the latter system a deposit), see Figure 4.

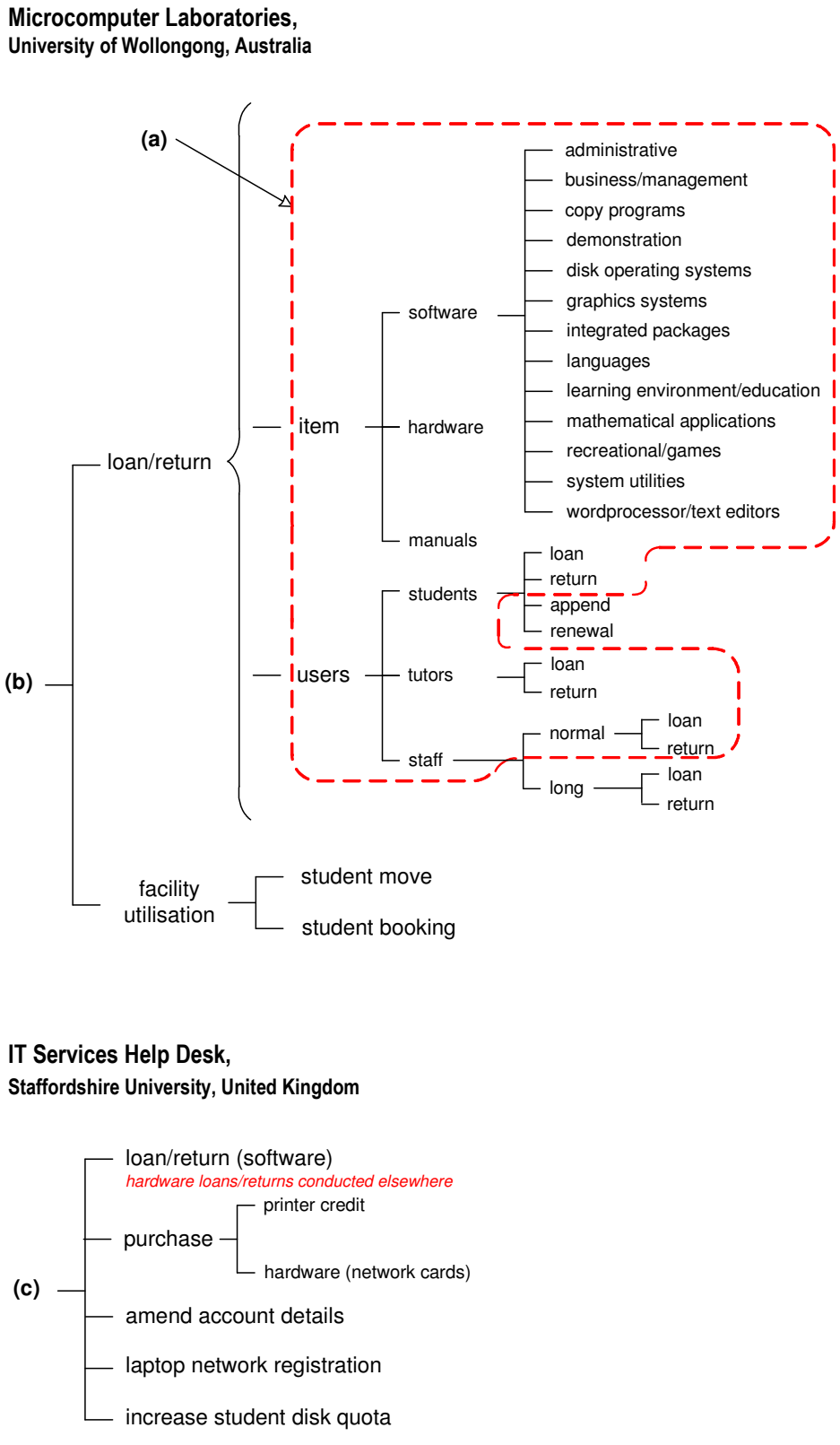


Figure 2: Provisional systems networks showing significant services provided by the systems under study: (a) the Manual System that was a direct predecessor to ALABS (b) at the Microcomputer Laboratories, University of Wollongong. (c) shows the smaller range of services provided by the IT Services Help Desk at Staffordshire University.

(a) SRq *1*; ISq *2*; MOq *3-4*

@Begin
@Languages: en
@Participants: ITS Informant, STU Student
@ID: en|samples|ITS|||||Informant||
@ID: en|samples|STU|||||Student||
@Sex of ITS: male
@Sex of STU: male
*STU: microsoft project
*STU: 0
%act: STU hands over student card
*ITS: 0
%exp: ITS gets manual from shelf, records loan using keybaord, hands manual to student
*STU: 0
%act: STU takes manual and leaves
@end

(b) Gq *1*; SRq *2-5*; ISq *21-22*; DSq *23-27*; MOq *28-30*; Fq *31-32*

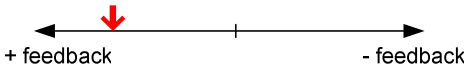
@Begin
@Languages: en
@Participants: ITS Informant, STU Student
@ID: en|samples|ITS|||||Informant||
@ID: en|samples|STU|||||Student||
@Sex of ITS: female
@Sex of STU: male
*STU: hi there
%sit: ITS and STU are at the helpdesk
*STU: do you hire software?
*ITS: yea we do
*ITS: what would you like to loan?
*STU: im after select
%exp: STU explains what software is required
*ITS: yea, you need to leave a fifteen pound deposit
*STU: oh yea
*ITS: is that ok?
*STU: thats alright yea
*ITS: but you do get that back when you bring the software back
*STU: brilliant
*ITS: right
%act: gets software out of the drawer
*ITS: ok then
*ITS: theres the cd
*STU: thanks
*ITS: its got all the information you need on the front of it there
%exp: ITS explains that all material needed is provided
*STU: the license details
*STU: ok
*ITS: right
*ITS: erm, whats your user id please?
*STU: its s p two two nine six eight eight
*ITS: ok and its the forth of march
*ITS: erm, right thats fifteen pound please
%act: gives the money
*STU: thank you
*ITS: thats lovely
*ITS: thank you
*ITS: erm thats lovely
*ITS: ok if erm, you get your money back when you bring the disc back
*STU: arr cheers
*ITS: alright
*STU: thanks a lot
*ITS: thanks
@end

(c)

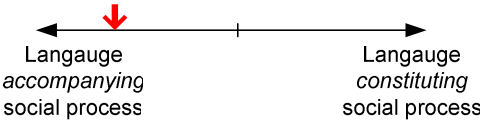
Mode (Text)

defined as the role language is playing in an interaction

- **spatial/interpersonal distance**



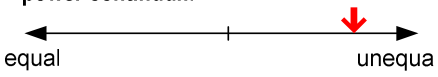
- **experiential distance**



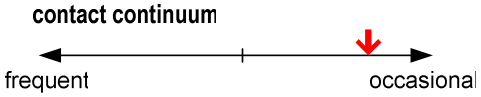
Tenor (Text)

the social role relationships played by interactants

- **power continuum**



- **contact continuum**



- **affective involvement**

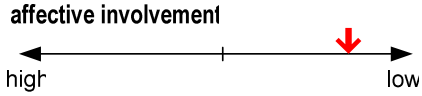


Figure 3: Modified CHAT transcripts representative of (a) the ALABS Student Loan workpractice at the University of Wollongong, Australia (after Clarke 2000) and the comparable (b) IT Service Help Desk Loan workpractice at Staffordshire University, UK. The generic staging is shown in transcript title bars and refers to transcript mainline numbers. Lexical items are underlined. The remaining register features are shown in (c), the values for which are identical in both systems.

Element Key: Greeting, Service Request, Identification Sought, Loan Form Borrow, Regulations, Enrolment, Materials Out, Deposit Sought, Finis,

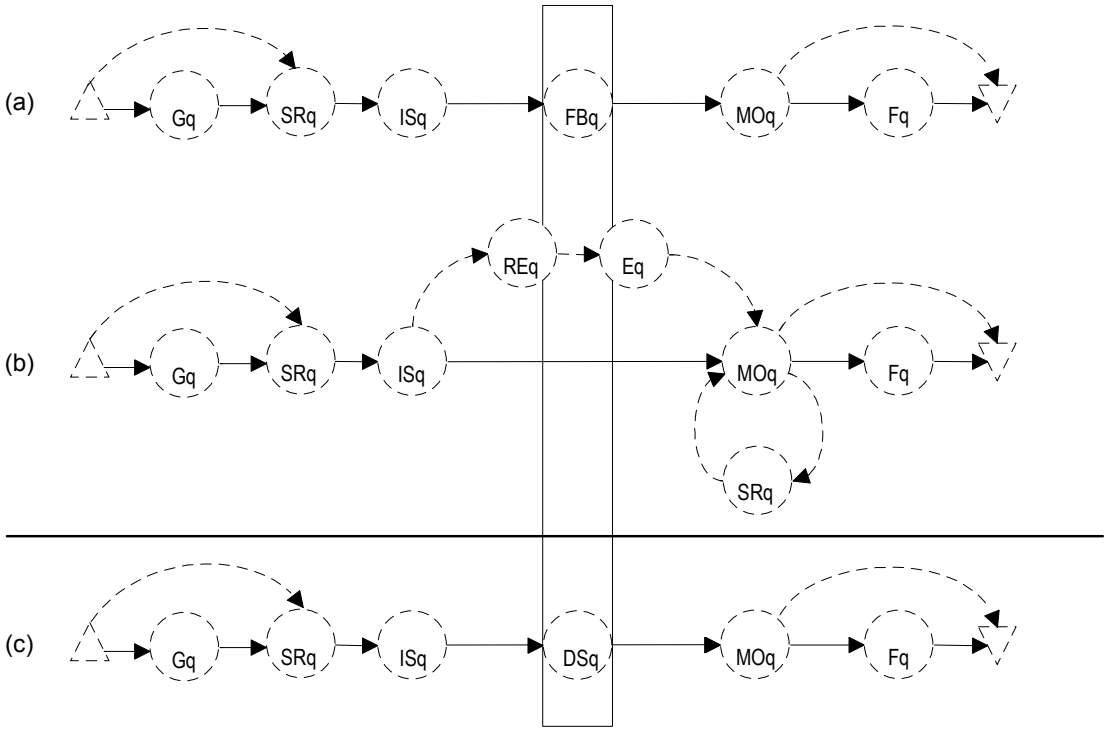


Figure 4: Comparison chart of genre digraphs show the structural and functional arrangement of qualitative (q) stages in Loan workpractices across multiple information systems. (a) shows the genre digraph associated with the Manual System Student Loan, while the respective workpractice of its successor system ALABS is shown in (b). An apparent evolutionary convergence can be found in (c) which shows the IT Services Help Desk Software Loan genre.

5 Implications for Work Activity (Re)design

5.1 Utility of Register

We demonstrated how it is possible for analysts and other social subjects to have determine that these systems resembled each other. This provides us with insights into how it might be possible create a systemic semiotic work (re)design. While it is relatively easy to demonstrate the utility of Register as a resource for analysts and others during systems development. These concepts are easy to introduce into computing science and information systems curricula, as I have done in introductory and advanced levels at within undergraduate and graduate awards, and are just as easy to teach clients. Although clearly this is very useful for analysis, the most important aspect of field, tenor and mode is not that they provide detailed communicative, semiotic and contextual explanations of how workpractices associated with systems functions have much greater degree of influence beyond the technologies they employ. What is even more interesting is that field, tenor, and mode are interrelated and mutually influence each other. Vary one of them and the others will change as well. A short example will suffice to illustrate this point. At the University of Wollongong, prior to 1988, *Departmental Secretaries* used typewriters and dictaphones to produce most documents. Technological and economic advances meant that they were also using PCs and dedicated computers for wordprocessing. For several years up until 1988, Departmental Secretaries shifted from typewriter based technology to computer-based technology. But in 1988, the General Staff Union responsible for the Departmental Secretaries argued that their job and duties had changed (field change). This lead to the union successfully arguing for a *job reclassification* in the Arbitration Court. Departmental Secretaries were reclassified as Administrative Assistants (tenor change)- different responsibilities and duties with higher pay! A knowledge of register can provide insights into the complex interdependencies that we know exist in organisations, but which seem difficult to understand using traditional information systems approaches. Register need not be limited to analysis of work situations- but could also be used to help understand the complexities that might arise when work activities are (re)designed.

5.2 Genre and Workpractice Evolution

ALABS provides evidence for the purposeful manipulation of *individual genres* associated with workpractices. Three basic operators were operationally identified: *cutting*: the removal of genre elements, *pasting*: the addition of genre elements and *elaboration*: both of the above. The evidence for purposeful manipulation of genres involve changes within disrete workpractices which are minimal and 'optimal' to some extend. Additionally some genres appear to change together-especially those which belong to the same genre assemblage. With respect to information systems *genre re-use* is preferred to *genre reinvention* (Clarke 1996)- it may also be a general mechanism for genre change.

5.3 (*Canonical) Genre as Design Process*

A consequence of developing the stratal model of systemic functional linguistics is that genre can also be treated as a system. By studying a large range of social situations, systemicists have discovered families of related *canonical genres*. These include the *factual genre* family, the *narrative genre* family and of course the *service encounter* which dominates the information systems examined here. We can consider these canonical genres as generalised classes from which more complex instances can be derived. These more complex genres are derived by applying the cutting, pasting and elaboration operators, described in §5.2. But here

we advocate the potential for applying these canonical genres directly during design. A system could be rapidly prototyped by means of first identifying the particular canonical genres that might apply to a given social occasion, elaborating them using the previously mentioned operators in prototyping sessions, walk through the resulting staging to determine its utility, and then specify intertextual connections between the workpractice genres to form the system itself. The direct application of canonical genre has already proved to be useful in more modest applications like the creation of user documentation for computer applications (Clarke 1991b) and in documenting user interfaces- echoing Madsen's (1996) comments as utility of semiotics for integrating different computing domains.

6 Concluding Remarks

In this paper, we have been concerned with addressing how apparently disparate and unconnected systems can resemble each other. The question of what counts as a systems resemblance lead us to choosing systemic semiotics which enabled contextual descriptions to be made- descriptions in which the workpractices associated with the systems features and ultimately the systems themselves could be understood by reference to the organisational contexts in which they existed. From this perspective the ontogenetic convergence between ALABS at the University of Wollongong, Australia and IT Service Help Desk at Staffordshire University in the United Kingdom was more apparent than real, limited to only one workpractice- the student loan of software. Nonetheless it seems that a systems resemblance can be inferred when the constituent workpractices of information systems consist of comparable register features, and especially if they exhibit comparable generic features.

Systemic semiotics in common with semiotic and linguistic approaches in general have an obvious contribution to work activity (re)design in information systems and computing science, but they are of a completely different order. It is 'broader' with respect to general mechanisms of interaction and the nature and status of claims made than traditional IS/CS. To the best of this author's knowledge, no published scientific papers have conclusively demonstrated that any communicative and/or semiotic approach has been able to produce an analysis, design and implementation for a given information system. This difficulty in dealing with the latter stages of systems development- what Erikkson (2005) has referred to as their theoretical 'blind spot'- implies that at least for the time being communicative and/or semiotic approaches will be 'narrower' with respect to their applicability across the entire development cycle. However, despite current limitations there is definitely a use for the kinds of detailed micro-level analyses that are possible with systemic semiotics and other semiotic and lingusitic approaches.

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