

Technologies, modes and pedagogic potential in live versus online lectures

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Institutions of higher education worldwide are increasingly making recorded lectures available online to all students. Rationales given for introducing these pedagogic modes includes claims of student demand, economic necessity, and pedagogic advantage. The research base in relation to the latter is especially thin, and the substitution of attendance in person with recorded lectures raises important issues regarding teaching effectiveness and learner experience. In this study we compare segments of pre-recorded voiced PowerPoints with video-recorded live lectures featuring the same lecturer, content and PowerPoint slides. The spoken texts for both versions were transcribed and analyzed and the body language of the lecturer was also tracked in the live lecture. Systemic Functional Linguistic tools are used to analyze how differences in the technologies and modes of communication impact on the construal of interpersonal, ideational and textual meanings. We approach the question from the perspective of context dependency - the potential for lecturer and students to connect in a you-and-me, here-and-now sense - and specifically to the construct of 'presence' (Martin & Matruglio, 2014). Analyses reveal considerable differences between the two lecture types and we propose important implications for the choice and design of pedagogic modes, particularly those of pre-recorded or live lectures.

Keywords: Lectures; Modes; Higher Education; Systemic Functional Linguistics; Context Dependency

1. Introduction

The past two decades have witnessed the widespread uptake of various forms of computer and internet-mediated teaching and learning in higher education, with considerable institutional and governmental support (Lea, 2007). Online is increasingly proposed as a 'viable alternative to some forms of face-to-face teaching, and as able to both replace and supplement it (Johnson, Adams Becker, Estrada & Freeman, 2015, p. 16). The latter model (supplementation) is broadly termed 'blended learning'; it combines face-to-face and online learning components in various configurations. The best known of these is probably the 'flipped classroom'. In such a model, students engage with

'information' or 'content' online while what is referred to as 'active, project-based' and 'collaborative' learning occurs face-to-face (e.g., Johnson et al., 2015, p. 38). In this way education is described as continuing "to move away from traditional lecture-based programming" (Johnson et al., 2015, p. 18); and institutions are increasingly making online lectures, once found only in fully distance courses, available or required for on-campus students. A range of options exists for delivering online lectures. Where 'live' lectures are provided for on-campus students, they may be recorded (whether routinely or on request) as voiced PowerPoint presentations. Less commonly, video recordings of the lecturer may be available. Where no 'live' lectures occur, lectures are pre-recorded, often as voiced PowerPoints—but also as podcasts, vodcasts or YouTube clips. In this study, we focus on voiced PowerPoints created by lecturers themselves, since this is a low-tech and cost-effective approach commonly found in higher education.

Institutional rationale for favouring online access to core subject content generally ranges from economic necessity to responding to reported demand by time-poor students, and on to claims of pedagogic advantage (e.g., Galway, Corbett, Takaro, Tairyan & Frank, 2014). However, the marketing hype surrounding such approaches is not as yet supported by robust empirical evidence, particularly in higher education (see Lander, 2013, for a comprehensive review of relevant literature). With regard to 'flipped classroom' models, the research base is particularly meagre. Claims of pedagogic advantage are mainly based on small-scale one-off surveys and single cohort studies in the immediate timeframe of a course (e.g., Galway et al., 2014; Pierce & Fox, 2012). Even then when comparisons are made to 'traditional' lecture models, results are often inconclusive. While claiming positive impacts on learning in a flipped classroom study, Galway et al. (2014, p. 5) also report "no statistically significant difference between examination scores across the two groups." Where student opinion is varied, as in "mostly positive" (Pierce & Fox, 2012, p. 196), unfavourable responses are rarely explored, particularly from the perspective of profiles of students. A further problem lies in a lack of adequate explication of highly abstract concepts underlying studies. This begins with the concept of 'flipped learning' itself, and to that of the 'traditional lecture'. There is an urgent need for more research that looks within branded practices of all kinds to explore the particular technologies, modes, and pedagogic interactions that characterise them.

Little is known, for example, about the effectiveness of voiced PowerPoints for teaching and learning, or about the user experience of such lectures. How do pre-recorded and live lectures differ in terms of features such as the structuring of content or the movement between abstract concepts and exemplification in more congruent everyday language? How do students

experience the absence of the 'embodied' lecturer and paralinguistic cues in the explication of new knowledge? Might we use these comparisons to make a judgement on whether online lectures should be substituted for face-to-face versions? Might we draw lessons from our analysis to help improve the quality of lectures of either type? In this exploratory study we use SFL-informed discourse analysis to compare slide-based segments of pre-recorded voiced PowerPoint lectures and the 'live' versions (video-recorded to enable analysis). The same content is taught by the same lecturer to students in the same cohort. Our focus is primarily on the lecturer's spoken language in both modes, with some references made to body language in the live mode.

2. Theory

The discourse analysis undertaken for this study is informed by Systemic Functional Linguistics (SFL) and by developments of that theory in ongoing dialogue with Legitimation Code Theory (LCT) (Maton, 2014). The relevant dialogue here concerns the nature of knowledge, particularly in educational contexts—with a specific focus on the notion of context dependency.

In SFL, language and other semiotic systems are interpreted as meaning making resources. And these semiotic choices are both reflective of and constitutive of context. Context is interpreted in this paper in relation to the register variables field, tenor and mode. These are respectively glossed as: the sequences of activity and the entities oriented to an overall institutional purpose; the relations of power and solidarity in the positioning of speakers; and the media employed and the kinds of communication they afford (Martin, 1992; Martin & Rose, 2007). Critical to an SFL approach to discourse analysis is the multifunctional nature of meaning (Halliday, 1994). Ideational meaning is language as reflection, construing "all that goes on around us, and also inside ourselves" (Halliday & Matthiessen, 2006, p. 511). Interpersonal meaning is language in action, enacting our personal and social relationships with others. Textual meaning has an enabling or facilitating role, organising the other two metafunctions as a coherent flow of information in discourse (Halliday & Matthiessen, 2006). Language is also modelled in SFL as a tri-stratal system of systems: *discourse-semantic* systems focusing on text structure; *lexico-grammatical* systems focusing on clause, group/phrase and word structure; and *phonological* and *graphological* systems of expression (Martin, 1992; Martin & Rose, 2007). In this paper our focus is from the perspective of discourse semantics, towards realisations in a range of lexicogrammatical systems.

Given our interest in the impact on meaning potential of different pedagogic modes, a key concern is the notion of context dependency and its realisations in language. Recent renewed interest in this notion has grown out of more

than a decade of dialogue between SFL and Legitimation Code Theory (LCT) (Maton, 2014). Of particular relevance is the domain of LCT referred to as Semantics, and one of its key principles, *semantic gravity*. Maton (2014) explains this sociological concept thus: “When semantic gravity is stronger, meaning is more closely related to its social or symbolic context of acquisition of use; when it is weaker, meaning is less dependent on its context” (2014, p. 110).

In SFL, the main linguistic construct that frames our comparative analysis is that of *presence* (Martin & Matruglio, 2014), which has been developed as a metafunctional theorization of context dependency. Presence refers to the extent to which language construes meaning in relation to the here-and-now of semiosis—from ideational, interpersonal and textual perspectives. As Martin & Matruglio (2013, 2014) note, while the concept of context dependency has long been referred to in theoretical and applied SFL studies (e.g., Cloran, 1999, 2000; Hasan, 1973; Martin, 1992) the dominant focus has been on the register variable of mode and its realisation in textual meaning—interpreted broadly as the role that language is playing in a given social interaction, in other words ‘the amount of work it is doing in relation to what is going on’ (Martin & Rose, 2007, p. 298; Martin 1992). Martin and Matruglio’s (2014) concept of presence broadens out our interpretation of context dependency with respect to field and tenor alongside mode.

Taking into account all three metafunctions when exploring presence means that a range of different linguistic systems is at risk in relation to each. Martin and Matruglio (2014) explain ideational presence in terms of *iconicity*, or the relative congruence of language with the activities and entities of the material world. Textual presence is described in relation to *implicitness*, or the extent to which language relies on other co-present semiotic systems to realize meanings that are implicit in language. And interpersonal presence deals with *negotiability*, or the degree to which meanings are made negotiable in the here-and-now. These relations are further explained and exemplified in the context of reported findings below. A metafunctional perspective on presence provides us with an analytical and interpretive framework for comparing how knowledge is made available to, and negotiated with students in the different lecture modes we investigate.

3. Context and sample

The data for this study consist of lectures selected from a postgraduate unit of study in advanced statistical techniques for health professionals. This unit is embedded in a program available on campus or online, and is offered in dual mode; that is, students can choose their study mode for this unit or combine modes. Students range from recent graduates to experienced professionals,

study full- or part-time, are generally in their 30s to 50s and include international students. The same lecturer presented both the pre-recorded and live lectures and used the same PowerPoint slides for both lecture types. He was experienced in face-to-face delivery and his teaching was always well evaluated by students; his experience with online teaching was limited. The unit of study consisted of 6 modules spread over 13 weeks and followed a fortnightly lecture (somewhat theoretical) and tutorial (application and practice) cycle for face-to-face students. Recorded lectures were supported by online discussions for distance students. The core content of the lectures focused on procedures for carrying out advanced statistical techniques and included phases of instructing, describing and explaining. Both lecture types involve a range of semiotic modes, including PowerPoint slides featuring diagrams of different types labelled with language and with numerical and mathematical symbols, and written language in tabular and bulleted list formats. These visual modalities are accompanied by spoken language and in the case of the live lecture by the lecturer's body language.

For the analysis of the lectures themselves, 4 modules were selected; these represent periods when the unit was underway and when it was significantly advanced (but not in its final stages). From the sets of PowerPoint (hereafter PPT) slides, shared across both lecture modes, six distinct slide types were identified (Appendix 1), of which five were used: Bulleted list (Type 2); Progressive table (Type 3); Progressive formula (Type 4); Graph (Type 5) and Concept diagram (Type 6). Sequences of spoken text corresponding to each slide type were selected for analysis. These were taken from all four modules recorded (to avoid any systematic bias in findings). The sequences of spoken language started when the slide came into view and ended when the next slide appeared; each slide had up to 8 'animations' (i.e., appearances of a new element).

Linguistic analyses of the lecturer's spoken language compared the prevalence of different choices as a whole across the data sets, as well as in relation to particular slide types, and the textual location within slide based segments. Raw differences in kinds of linguistic choices are meaningful over the entirety of lecture or in slide-based segments of talk since every instance of a given measure contributes to the construal of greater or lesser presence.

4. Findings and discussion

Our aim in this exploratory study is to identify how the construct of presence is realised in the pedagogic modes of a voiced PowerPoint (hereafter VPPT) and live lecture. In other words we explore how the lecturer's talk in each mode constructs to varying degrees a shared here-and-now, you-and-me with students. It is hoped that findings can inform pedagogic decision-making

around both design and sequencing of modes of interaction.

4.1. Textual meaning and presence

Textual meaning is realised in the discourse semantics of language in two systems, IDENTIFICATION and PERIODICITY (Martin, 1992; Martin & Rose, 2007). IDENTIFICATION refers to the resources for introducing people and things into a text and keeping track of them once there. PERIODICITY refers to the way that interpersonal and ideational meanings are packaged up as pulses of information that are potentially forecast or reviewed.

Both these systems and the linguistic choices they offer are concerned with “the discourse making sense to the reader or interlocutor in relation to the channels of communication available” (Martin & Rose, 2007, p. 155). From the perspective of IDENTIFICATION, language may be required to do more or less work—that is, it can be more or less implicit or explicit in the identification of entities. In written text where there is no possibility of immediate aural or visual feedback, there is more pressure towards explicitness. In face-to-face interaction language can play a relatively reduced role enabling some meaning to remain implicit. Presence from a textual perspective is thus explored as degrees of *implicitness* (Martin & Matruglio, 2014). A number of linguistic resources are implicated, including those of exophoric reference to people and things outside the text, or endophoric reference to entities within the text (Martin, 1992). From the perspective of PERIODICITY, implicitness has to do with whether or not a text overtly signals its organising structure in a hierarchy of predictive Themes and consolidating News.

4.1.1. IDENTIFICATION

A comparative analysis of exophoric reference in the data reveals its greater density per slide-based segment of talk in the live lecture compared with the VPPT mode. A first take on exophoric reference to people identifies instances of *you* and *we*, where *we* is interpreted specifically as *you and me* in this space (and not as a generalised reference to field of knowers—i.e., ‘*we*’ as *statisticians*). These are exemplified below:

*You might be wondering why we don’t calculate the mean square
What can you say about the difference?
So you may have seen it if you’ve done first semester
So we’ve seen them before, but we’ve also seen effect modifiers,
So let’s see what this looks like in practice.
The only interactions that we’re calculating here are*

In total across the corresponding slide-based segments of talk, there were 8 instances of *we* and 1 of *you* in the VPPT, and 29 instantiations of *we* and 7 of

you in the live lecture. The density was also higher for each slide type in live lecture talk, where it functions more strongly to bring the students into the discourse as participants.¹

Exophoric reference to non-human entities can be expressed verbally, and additionally or alternatively through the embodied deixis of pointing with a finger or hand or a mediating cursor or laser beam, or both (e.g. Hood, 2011). A comparative analysis of verbal deixis alone reveals considerably more instances in the live lecture than in the VPPT across the corresponding slide-based segments of talk. In the live lecture some instances reference the slide in general:

as I say here ...
so we saw this last week ...

Others reference specific information in slides;

this number here
in this line we can see that ...
their smoking effect would be estimated by this bracket

It is clear that these latter examples reference specific information because the verbal deixis couples with either an embodied pointing gesture or a mediating laser beam. Specificity can be scaled by degree in body language along a scale from the whole hand, to a number of fingers, to the fine point of the little finger (Hood, 2011). The availability of gesture thus reduces the linguistic load for identification. While embodied pointing is only available in live lectures, the use of a cursor is an option in some technologies for VPPT; this resource was not used in our data. There are very few instances of exophoric reference in the VPPT, and where they do occur they can only be interpreted as referring in a general sense to the slide content:

The analysis of variance is usually presented in this way
We can replace the long formula ... by this formula
Notice in this graph ...

From a textual perspective then, the language of the live lecture displays a higher degree of implicitness; the live lectures are more strongly grounded in the here-and-now of people and things – in the shared sensory context of the lecture theatre.

4.1.2. PERIODICITY

The second discourse system at risk with respect to implicitness is

PERIODICITY. Discourse can be more or less self-organising through the ways in which meanings are packaged up and presented. Here we explore whether and how the discourse employs an organising structure of higher-level Themes (Martin & Rose, 2007; Martin & Matruglio, 2013, 2014). The more planned a written or spoken text is, the more explicit it is likely to be in this regard. A text that is constructed in response to and contingent on events in the here-and-now is likely to unfold in a more iterative serial structure.

Table 1

A Comparison of Macro-Thematic Choices in Both Modes Across Slide Types

| Slide type | Macro-Themes in VPPT | Macro-Themes in Live Lecture |
|------------|--|--|
| T2 | In addition to assessing confounding, we must also assess whether any variables are acting as effect modifiers. | So we've seen them before, but we've also seen effect modifiers, ... |
| T3 | The analysis of variance table is usually presented in this way. | So let's see what this looks like in practice. Analysis of variance table constructed like this. |
| T4 | To obtain an estimate of the overall variance let's use the variance from each group. | So what we're doing here is looking at the variance within each group, the variance of points within the group. |
| T5 | The first possibility is that smokers and non-smokers have the same regression line, diastolic blood pressure equals A plus B1 times age. Age clearly has an effect on diastolic blood pressure but there's no effect of smoking, as after adjusting for age, or for people of the same age, the effect of smoking is zero | The first of which will be this, in this line we can see that smoking...that after adjusting for age, smoking has no effect. So remember what after adjusting means, it means for people of the same age, is there a difference between the non-smoking line and the smoking line? |
| T6 | We may be interested in assessing the effect of vitamin A on lung cancer, so vitamin A is our exposure variable and lung cancer is the outcome. | For example, I think it's a really good idea to start thinking or to think of the triangle. We've thrown it at you a few times but I think it really works. We're looking at the effect of vitamin A on some lung cancer score. |

Comparative analyses of the data reveal different patterns in PERIODICITY in the presence and nature of macro- and hyper-Themes (Martin & Rose, 2007).

Both the VPPT and the live lecture modes regularly employ macro-Themes at the beginning of phases of slide types (see Table 1); and they frequently employ hyper-Thematic elements with the appearance of each new slide in a slide type segment (with the exception of type 3). Thus both modes display a degree of self-organisation, as is to be expected in any lecture mode given its basis in reflection on uncommon-sense knowledge. Table 1 displays the macro-Themes for comparable slide type segments of talk. These choices foreground what is made thematic for the one or more slides in the segment.

These higher-level Themes for comparable slide-based segments of talk display contrasts in exophoric reference as discussed above. In the live lecture the macro-Themes frequently begin with a conjunctive link (*so*). These explicitly link a new segment of talk to that which preceded it, pointing both backwards and forwards as they package the meanings of the lecture into an unfolding implication sequence. The '*For example*' in the live lecture (type 6) has this same Janus function. The VPPT macro-Themes by comparison function to more strongly differentiate each new slide-based segment of talk. The packaging displays a relatively higher level of explicit self-organisation in this regard, and a relatively lower level of textual presence.

It is interesting to speculate on how the two modes impact on textual organisation in this way. Does this have to do for example with what the primary object of visual attention is for the lecturer? In the live lecture data the video makes apparent that the lecturer's gaze is predominantly towards the students in front of him. He is in that sense meaning to the students. If the lecturer's gaze in the preparation of the VPPT is to the slides and their content, we can suppose that he is mainly attending to the pre-planned content.

4.2. *Interpersonal meaning and presence*

Interpersonal meaning is realised through the discourse semantic systems of NEGOTIATION and APPRAISAL. Choices from both systems are implicated in an interpersonal take on context dependency, referred to as *negotiability* (Martin & Matruglio, 2014). Here we focus on NEGOTIATION, as analyses of APPRAISAL reveal little difference across the modes in our data.

4.2.1. NEGOTIATION

The NEGOTIATION system (Martin, 1992; Martin & Rose, 2007) is concerned with interaction as the exchange of knowledge and/or the negotiation goods and services between speakers; it is where "the sharing of propositions and proposals (i.e. knowledge and action moves)" is enacted (translated from Martin & Matruglio, 2014, p.199). NEGOTIATION from the perspective of presence involves degrees of dialogic exchange and choices from systems of

tense, modality and person (Martin & Matruglio, 2014).

4.2.1.1. Dialogic exchange

The potential for dialogue or negotiability (where actual repartee is not needed) is greater in the live lecture, where both aural and visual feedback is immediately available. Nonetheless a lecture in either mode might remain dominantly monologic or may employ various dialogic devices. Questions, for example, might be proposed in either mode, whether as rhetorical questions or as anticipating an answer, whether voiced or not. In our data dialogic exchanges involving interrogative constructions are only encountered in the live lecture and appear in slide types 2, 4 and 5. Some are posed in expectation of a student response, thereby constituting genuine requests for information:

Does anyone want to ask anything about that?

Others function as rhetorical questions driving the learning forward:

What about smoking times age? Well, we would...

Have other people found that smoking modifies the effect of age? (...) If they have then they should be treated like any other ...

Both lecture types contain dialogic moves associated with the negotiation of goods and services. Some are congruently realised:

So remember ... so include them...

Let's ...

These are roughly equal in number in both lecture modes.

Across both modes, the majority of such negotiation moves are realised as interpersonal grammatical metaphors, as modalised indicatives in active or passive constructions, and thus somewhat removed from immediate negotiability, as in:

[Live] *they should be treated like any other...* (more congruently: *treat these like any other*)

[Live] *I think it's a really good idea to start thinking or to think about the triangle ...* (more congruently: *start thinking about the triangle*)

[VPPT] *a sensible estimate of the overall variance would be to take ...* (more congruently: *Estimate the overall variance, by taking That is the sensible way to do it*)

[VPPT] *overall variance can be estimated as the within-groups sum of squares ... (more congruently: Estimate the overall variance by adding the squares)*

However, the incongruent realisations are more strongly preferred in the VPPT segments, relatively reducing potential for negotiability as you-and-me in the here-and-now.

The enactment of exchange structures also involves choices in PERSON, TENSE and MODALITY, all of which affect degrees of negotiability, and thus degrees of context dependency in the discourse.

4.2.1.2. TENSE

The choice of present tense representing “action co-occurring with the moment of speaking” (translated from Martin & Matruglio, 2014, p.196) is indicative of a higher level of interpersonal presence because it positions negotiability in the here-and-now. Where past or future tense occurs it displaces events from the present, displacing negotiability. In our data, present tense was preferred over past and future in both lecture types. Narrowing the focus to material processes, however, we find instances of present in present tense in the live lectures, but not in the VPPT mode. These occur in live lectures in commentaries on unfolding statistical procedures, as in:

*So what we're doing here is looking at the variance within each group, the variance of points within the group. So what we're doing is calculating a weighted average of all of the individual standard deviations
...focus on what it's doing. We're weighting, we're getting an average*

As Martin and Matruglio explain, “with material and behavioural processes, simple present tense in English refers to habitually recurring events, not specific ones” (translated from 2014: p. 197). By contrast, the choice of present in present, as in the examples above, grounds the activity and positions the negotiability in the specific here-and-now.

4.2.1.3. PERSON

The use of pronouns was discussed in section 4.1.1 in relation to exophoric reference and textual presence. Here we discuss how PERSON is implicated in negotiability, in terms of pronouns positioned as the nub (Subject) of propositions. First or second person pronouns in the nub (compared to the third person pronoun in this role) ground the negotiability of the proposition in the you-and-me of the here-and-now.

The two teaching modes under consideration here differ markedly in this regard. This goes well beyond differences that could be attributed to their unequal lengths. Across all VPPT segments there are 27 instances of first and second person as the nub of propositions, compared to 76 for the live lecture segments. However, as with the analysis of the role of personal pronouns in textual presence, so here from an interpersonal perspective, we need to differentiate the *we/us* in the specific pedagogic field of the lecture from the *we/us* of the broader *disciplinary* field of biostatistics. The former are unambiguous in instances where the lecturer refers to the shared past or concurrent experience of the group, as in:

*Remember what we did with the T test?
So what we're doing here is looking at the variance....*

The latter relate more to the activities of statisticians, as in:

*We can estimate the effect of smoking at that age...
We first consider variables that modify..*

In the VPPT, across all slide types, more than 80% of first person pronouns in the nub relate to the disciplinary field, with proportionally fewer related to the *you-and-me (we)* of the pedagogic context. There is only one instance each of *I* or *you* and two of *let's*. Across all live lecture segments, the proportions are more balanced with respect to the *we* of the disciplinary field, and the *we* of the lecturer and students. There are also many more instances of *I* and *you* in the nub. Thus *negotiability* is much more strongly interpersonally contextually dependent in the live lecture than in the VPPT.

There are also differences in the use of passive construction across modes. These have the effect of depersonalising the nub. In the VPPT segments there are significantly more passive voice constructions with agency elided, as in:

group variances can be calculated ... a weighted average is obtained

Live lectures have fewer such constructions. Overall they exhibit a more strongly context dependent negotiability than their VPPT equivalents.

4.2.1.4. MODALITY

As Martin & Matruglio (2014) explain, the choice of modality over tense in the Finite element of the clause excludes the possibility of grounding it temporally in the here-and-now. It does however open up the possibility of “subjective assessments of probability, usuality, inclination, obligation and ability on the part of speakers (in declaratives) and listeners (in

interrogatives), and so is in a sense interpersonally dependent on the moment of speaking” (translated from Martin & Matruglio, 2014, p.196). A comparative analysis of overall choices for modalisation as probability reveals little difference across the modes. However, we need also to distinguish explicit subjective (*I think it is*) versus implicit subjective (*It might be*) modalisation. The former encodes the you-and-me of the interaction more so than does the latter. It enacts the negotiability in a more context dependent manner. Instances of explicit subjective are only found in the live lecture data, as in:

I think it's a really good idea to start thinking ... of the triangle,
but I think it really works.

One common task across both lecture types in these data is to elucidate for students information that is also visible on slides. So it is not surprising then to find some degree of interpersonal presence in both modes. Our analyses show that the live lecture segments display relatively stronger interpersonal presence than the voiced PowerPoints by virtue of more instances of dialogic exchange, a higher proportion of first and second person pronouns as the nub of propositions, lower levels of passive voice realisations that depersonalise the nub, and more use of present and present-in-present tense in material processes. It is only in the live lecture that there are instances of explicit subjective modalisation.

4.3. Ideational meaning and presence

Ideationally, presence (*iconicity*) refers to the degree of congruence in the discourse; i.e. to the extent to which the linguistic construal of ideational ‘reality’ matches what we take as ‘natural’ representation. Martin and Matruglio (2014, p. 202, translated) explain this as “the degree of iconicity between what is going on in a field and its construal in discourse.” Ideational presence concerns both experiential and logical meanings, and the relevant discourse semantic systems here are IDEATION and CONJUNCTION. As far as iconicity is concerned, *congruent mappings between discourse semantics and lexicogrammar* are more present than grammatically metaphorical ones.

4.3.1. IDEATION

Given the academic nature of the discourse, it is not surprising to find a considerable degree of experiential grammatical metaphor in both lecture modes; and given the specific field, there is also a fair amount of technicality. We have attempted where possible to differentiate between 'live' grammatical metaphors involving stratal tension (Martin, 1993) and technical nominalisations that are simply abstract concepts in the field. For example, in

'This gives us the best **estimate** of the overall standard deviation' (live lecture) and 'to obtain an **estimate** of the overall variance' (VPPT), *estimate* is in each case taken as a grammatical metaphor. It is a grammatical 'thing' construing the process of estimating a measure. But both '*deviation*' and '*variance*' are considered here to be technical terms in the field; they are grammatical 'things' realising semantic entities, not processes. Congruent representations are slightly more prevalent in the live lecture than in the VPPT. Consider for example the following contrasting instances:

(VPPT) *The interactive term is retained in the model if and only if its **inclusion** alters the size of the effect.*

(Live lecture) *'we **include** them in the model if and only if they alter the size of the standard error'.*

And in the live lecture we find movements between more congruent and more metaphoric construals of experiential meaning not found in the VPPT mode, as in:

*'so ... as age **increases** diastolic blood pressure **increases**, but **the rate of increase** is different for smokers and non-smokers'.*

As well as experiential metaphor, there is evidence of logical metaphor as a causal relation in the VPPT. For example, causal relations are construed as a process in '[it] **depends on** whether a person is a heavy smoker', and as an entity in '*the **effect** of E on the outcome*'. The numbers of instances of grammatical metaphor are small in the data, so taken alone do not provide a strong indicator of ideational presence. Logical meaning, however, presents a clearer degree of difference across modes.

4.3.2. CONJUNCTION

There are considerably more congruent expressions of logical meaning in the live lecture. Congruent causal relations, serially connecting clauses, are indicated in bold in the following examples from the live lecture:

*So **if** we've got a treatment variable, a treatment or control, (**then**) do males respond differently to females?*

*So does another variable **change the effect** of E?*

***If** there is an effect modifier,*

***then** we can no longer talk about the **effect** of E,*

***because** it changes for males and for females, (because) they're different from one another.*

*So there's no longer one **effect** of E.*

... non-smokers are older than smokers

so *if* we ignore age
(then) it would look like non-smokers had a higher diastolic blood pressure
 than smokers
Once we adjust for age,
 that difference disappears
because age is a confounder of the relationship.
 The apparent difference we see is **due** entirely **to** age ...

In the latter example, we see a logogenetic shift from congruent expressions of logical meaning in causal relations between clauses (e.g., *so ...if ...because...*) to the grammatically metaphoric expression of cause in the clause (*due... to*). This is akin to the example above of shifts for experiential meaning. These movements within a phase of talk from congruent to metaphorical representations were only seen in the live lectures.

From an ideational perspective on presence, both modes display grammatical metaphor both experientially and logically, but the live lecture mode is more congruent overall, thereby construing a higher degree of presence than does the VPPT modes.

5. Conclusion

This study has compared matched live lecture and voiced PowerPoint segments from 4 lectures by analysing the realisation of *presence*, the semiotic construal of context dependency, across all three metafunctions. This is explored in the lecturer's spoken language, with some comments on relevant features of body language in the live lecture. We briefly review these findings before addressing possible pedagogic implications and suggestions for further research.

As far as interpersonal presence (*negotiability*) is concerned, the live lecture enacted the interaction as more grounded in the you-and-me, here-and-now with respect to its use of present tense, first or second person pronouns in subject position, and dialogic exchanges. In terms of MODALITY, the live lecture displayed instances of explicit subjective modalisation not found in the VPPT.

Turning to textual presence (*implicitness*), IDENTIFICATION was explored in terms of the amount of exophoric reference to people and entities retrievable from the shared physical environment. More exophoric reference is found in the live lectures than in the voiced PowerPoints. In terms of PERIODICITY, the voiced PowerPoints more strongly resemble patterns of higher-level Themes found in written discourse, organising the discourse in a less context dependent way. The live lectures were composed more context-dependently as serial flows of meanings, responsive to contingent reasoning or feedback.

Ideational presence refers to levels of congruent versus metaphoric construals of meaning or “the degree of iconicity between what is going on in a field and its construal in discourse” (Martin & Matruglio, 2014, p. 202, translated). A comparative analysis reveals higher levels of iconicity in the live lecture and lower levels in the voiced PowerPoints with respect to comparable slides, and more instances of movements from congruent to metaphoric construal of meanings.

The limited data analysed in this exploratory study means that for any one system implicated in identifying degrees of context dependency, the number of instances can be relatively small. That is, considering choices in, for example, explicit subjective modalisation, or congruent experiential meaning, the results may be suggestive but not conclusive. Nonetheless there is a consistent trend towards more context dependent choices within and across metafunctional systems in the live lectures than in the voiced PowerPoints. An aggregation of such choices taken as a whole reveals that the spoken language in the live lectures more strongly grounds the discourse in the you-and-me, here-and-now. On this basis we can claim that the pedagogic discourse the students encounter in the live lectures is one in which, relatively speaking, knowledge is more often exchanged in the here-and-now of the material situational setting, more often involves movements between more congruent and more metaphoric construals of meaning, and is more often negotiated in the 'me-and-you' of the speaker/addressee interaction.

6. Limitations and recommendations for further research

This paper reports on an exploratory study comparing difference in meanings encoded in matched pairs of live lectures and voiced PowerPoint modes of teaching and learning. It has been written to raise issues worthy of further exploration. Our focus has been on the lecturer’s spoken language, since student questions in the live lecture were largely not captured in our recordings and usually not repeated by the lecturer; they are of course non-existent in the virtual lecture. Our analysis was synoptic, building an overall picture of linguistic preferences that relate to greater or lesser context dependency across the three metafunctions of language. In this study only minimal attention was paid to tracking movements between low and high context dependency as the lectures unfold. Tracking of this kind would add another important dimension to explorations of knowledge building (see, e.g., Martin & Maton, 2013). Another consideration which deserves further attention has to do with the semiotics of space, and implications that might flow from the experience of being co-present in the bounded physical space of a lecture theatre (see, e.g., Stenglin 2009). Importantly, data are also limited in this study to one disciplinary field. A wider research base would contribute to a better understanding of how disciplinary differences in relations to

knowledge impact on the construal of meanings in different modes.

- *Pedagogic implications*

Contributions to discussions around modes of interaction in teaching and learning in higher education come from many quarters and include arguments based on financial advantage, technological imperatives, and lifestyle preferences. The findings from this study offer a contribution from a pedagogic perspective, addressing questions of how different modes and modalities of interaction support students as they move into fields of new specialised academic knowledge. From a pedagogic point of view, we need to revisit questions about the choice of modes. For example, where choice exists, ought we to promote face-to-face lectures, alongside other modes, and what might guidelines for quality teaching/learning in different modes look like? For example, in response to the contributions of this paper, could increased presence in voiced PowerPoints be achieved by suggesting that lecturers avoid reading from a script in favour of extemporising from notes and imagining themselves in front of an audience of students? We can also ask what mix of modes in what sequences might be most supportive of knowledge building.

It might also be suggested that where online lectures are a preferred option or an institutional imperative, then modes which capture voice and visuals including slides and the lecturing body, are to be preferred – in other words a video capture of live lectures. This raises a further set of issues, including those of cost and ethical questions of privacy. It also assumes that a live lecture mode is available to be videoed, which may be counter to institutional objectives.

All these considerations are important in view of the current investment of resources in online learning, the cost of poor design and its impact on students' opportunities to enter effectively into fields of specialised academic knowledge. As this paper shows, by highlighting the way different modes of teaching and learning impact on the meaning potential available to students we have a stronger knowledge base from which to design or select both the modes of pedagogic encounter and the sequences in which they might best be accessed.

Notes:

1. Personal pronouns in their role in interpersonal presence, or negotiability are discussed in the next section

Acknowledgements

The authors would like to thank the lecturer who agreed to the recording and analysis of his lecture presentations and Sydney Medical School for a small research grant to support this project.

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Appendix 1: Slide types

The PowerPoint slides for all four lectures were surveyed and six slide types identified, as follows:

- Type 1 aims/objectives/learning outcomes bulleted list
- Type 2 Bulleted list (relating to field content; may be gradually built up with animations or presented in its entirety)
- Type 3 Progressive table (table relating to field content progressively built up with animations)
- Type 4 Progressive formula (as above but featuring a mathematical formula)
- Type 5 Graph (generally presented in its entirety)
- Type 6 Concept diagram (presented in its entirety, the least common slide type)

After consideration, slide Type 1 was not included in the analysis, since it was found only once in every module and in any case represented a version of Type 2.

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