Article

The descriptive/procedural distinction is flawed

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The traditional distinction between descriptive and procedural markup is flawed; it conflates two different dimensions — mood and domain — which in fact can vary independently. An adequate markup taxonomy must, among other things, incorporate distinctions such as those developed in contemporary "speech-act theory". This will substantially complicate, although in interesting ways, the development of an adequate theory of markup semantics, as formalization will require modal operators and additional axiomatic relationships. In addition, these reflections reveal that there are foundational issues in markup theory that are not yet resolved, in particular the precise relationship between markup and text.

Introduction

The markup taxonomies of the 1980s were very effective in explaining and systematizing various phenomena of text processing and played a crucial role in providing the ideology for the campaign to promote the "content object" approach to designing and applying text processing systems and text encoding languages. But a close examination reveals that the best known and most important bit of taxonomizing — the distinction between descriptive and procedural markup, which is at the foundation of most current thinking about markup systems — is in fact clearly flawed.

In what follows I will analyze the problems with descriptive/procedural distinction and suggest some possible revisions which accomodate the problem cases and point toward a new categorization with improved explanatory and predictive power. My inital analysis draws directly on John Austin's original notion of a "performative", but ultimately I wish to suggest that, in addition to that notion, the more general and recent work along these lines in contemporary linguistics (and, specifically, "speech act theory") can contribute to our understanding of markup semantics and pragmatics. I will draw several further conclusions from these reflections, suggesting some complications for the formalization of markup

semantics, and also that some fundamental issues in the relationship between markup and text still seem to be unresolved.[1]

The descriptive/procedural distinction

Early discussions of markup distingished markup from text, and then further categorized markup into two or more kinds. The most important and most influential distinction was between *descriptive* markup and *procedural* markup, and its locus classicus is Charles Goldfarb's seminal 1981 paper [Goldfarb 1981].

Characterizations of this distinction are many and familiar to all of us. They typically run along these lines:

Descriptive markup describes/characterizes/identifies a text component/feature/part

Procedural markup invokes/specifies/commands a formatting/rendering procedure/effect/process/action

This distinction is an important one for us. It is arguably at the very heart of markup theory and it is typically considered closely related to the dominant recommendation that effective text processing requires modelling text as a structure of "content objects". However, this distinction has received surprisingly little criticism, and, as far as I know, there has not even been a sustained discussion. In what follows I will argue that it is fairly easy to see that the distinction is flawed and that the remedies require considerable theoretical development of our notions of markup and text. The good news is that nothing in this account suggests that those of us who accept the "content object" view have to give up any of our most fundamental tenets of markup theory and text ontology — only that more refinement is needed.

Problem no. 1: Markup that describes formatting

SGML-based humanities text encoding projects in the 1980s almost immediately turned up a slight awkwardness with the decriptive/procedural distinction, but it was one that seemed so obvious in its resolution that little was made of it. Consider a transcriber who wishes to indicate some renditional feature of a document, that the typeface is 16 points, or that the title is centered, or that a word is in bold. Indicating, with markup, the presence of such textual features in a source

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text being transcribed and encoded is quite different from inserting markup in order to get those effects. So what sort of markup, then, is markup that means, e.g., "this is rendered in bold"? In common with typical cases of descriptive markup, this markup is describing, identifying, or characterizing — rather than serving the causal or imperative function of procedural markup. However there was an almost universal hesitation about calling this markup descriptive. The reason for this hesitation is obvious: the sort of thing that is being described, a formatting effect, was always seen as the proper business of procedural markup (to invoke); and not, typically, the business of descriptive markup (to describe). Descriptive markup, after all, was the vehicle for implementing the "content object" view of text, according to which text was composed of things like sections, titles, and paragraphs — and not things like columns, type size, and font shifts.

This is a problem which on one level is, actually, easily ignored. One notes that strictly speaking the markup in question is descriptive, though odd . . . end of story. That this attitude has the unsettling effect of weakening the connection between the descriptive/procedural distinction and the theories of text representation strategies it is traditionally associated with — and which seem to give it its significance — seems, peculiarly, to have been rarely noticed.[2]

However, a more illuminating analysis of the problem is readily available and one that allows us to preserve the traditional connection, although in a new more fine-grained form. This analysis begins by observing that while the descriptive and procedural categories as they are typically deployed are disjoint, they are not mutually exhaustive. And that the reason they fail to partition the markup space is that they are boolean composites, in this sense: they are each made up of two functional components, each of which in turn seems to be two-valued. Those components are:

Mood: whether markup describes something, or requests processing
Domain: the sort of thing being described, or requested

We can now say that descriptive markup is markup that is in the *indicative* mood, and, at least as it is typically deployed and illustrated (that is, in its use to identify the "content object" parts of a text) has a *logical* domain. Procedural markup on the other hand is in the *imperative* mood and has a *renditional* domain.[3]

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2   That this use of descriptive markup is indeed seen as odd even by those willing to tolerate it is confirmed in the following passage from the TEI Guidelines: "for certain types of analysis (most notably textual criticism) the physical appearance of one particular printed or manuscript source may be of importance: *paradoxically,* [italics added] one may wish to use descriptive markup to describe presentational features such as typeface, line breaks, use of white space and so forth." [Sperberg-McQueen and Burnard 1993]

3   This analysis of markup along these two separate dimensions was anticipated by Mavis Cournane, who identifies two "axes" for markup categorization: logical vs. visual and procedural vs. declarative [Cournane 1997].

So the problem with "rendered-in-bold" is now evident: it is in the indicative mood (like descriptive markup, and unlike procedural markup), but with a renditional domain (like procedural markup, and unlike descriptive markup), which means that while it may be descriptive in the very narrow (and rare) sense mentioned above as a too-easy solution to our problem, it is not descriptive in the more typical, traditional, and broadly explanatory, sense of descriptive markup — that is, in the sense in which descriptive markup is a composite of indicative mood and logical domain. So we see that "rendered-in-bold" is thus a third kind of markup, neither descriptive nor procedural.

It will be tempting at this point to try again to say that the descriptive/procedural distinction is only about mood, and not domain. This is a response which in fact has something said for it, and, in particular, receives some support from its resonance with certain critiques of the content object approach to text ontology. But I think that in the end this narrow interpretation of descriptive markup, restricting it to a mood distinction only, is just not plausible. The descriptive/procedural distinction has been closely associated with the logical/renditional domain difference for very good reasons. It is in fact only from that association that the distinction gets its fundamental significance and explanatory power. Descriptive markup is not as theoretically significant as it is because it is in the indicative mood, but rather because it is about elements from the logical domain: that is, it is significant (and, in particular, explanatory and predictive) because it is about the relatively enduring stable features of texts *qua* intellectual objects. It is from

Descriptive markup: describes / names / characterizes / identifies (Mood)
parts / structures / components / features (Domain)

Procedural markup: invokes / specifies / commands / instructs (Mood)
formatting / processing / effects / actions (Domain)

Figure 1 | An analysis of the descriptive/procedural distinction in terms of mood and

Mood: . *Domain:*	**Imperative**	**Indicative**
Renditional:	`<bold>` *authorial*	`<bold>` *transcriptional*
Logical:		`<title>`

Figure 2 | Classifying markup that describes rendering (Problem 1)

this connection that the indirection, so important to engineering text processing systems derives — indirection being a matter of data abstraction not grammatical mood.

So, two dimensions, each with two values, yield four combinatorial possibilities. We have found instances of three so far. It is natural to wonder if there is any markup, either found in nature or synthesized in the lab, that corresponds to the other remaining combinatorial possibility: imperative mood + logical domain. And what sort of semantics would this markup have? Something along these lines apparently: "be a paragraph!"? But that's absurd . . . or is it?

Problem no. 2: Markup that creates

There is in fact another interesting classification difficulty that suggests a candidate for this remaining type. Sentences in the indicative mood, which describe something as being some way or other, are typically and naturally thought of as factual reports, and as being either true, or false. They are true if the characterisic they attribute is in fact enjoyed by the subject of attribution, and false otherwise. This squares perfectly with much of traditional SGML transcription and encoding of primary source documents. The transcriber thinks she sees a title, and marks it as such in her transcription. She might be wrong (it's an epigram, not a title) or she might be right: it is indeed a title.

But consider the development of an original document by its author. The author desires to begin a section with a title, and adds the words of the title, and the encoding which identifies it as a title. It might not be a good title, and the author may be wrong about many things associated with this title, but could he be mistaken, in exactly the same sense as the transcriber is above, about whether or not it is a title? Could what he is at that moment authoring, and believes to be, intends to be, a title, actually be something else entirely (an epigram, abstract, or citation for instance) which he is mistaking for a title?

Most of us would say not. In fact, upon reflection, we would say that the use of authorial markup in the logical domain, such as that used to create a title, typically has these two features:

1. It is not, really, a true or false report, not being a report at all.
2. It is actually being used to create the component in question, not to report its presence.

The first feature suggests that authorial markup of this sort, despite its similarity to true descriptive markup, is not in the indicative mood, and the second suggests a connection with actions and subsequent effects that resonates with our notion of imperatives like commands and instructions. These two features would thus seem to place authorial markup like titleing right in the empty cell of our

classification matrix (3). So it seems we have indeed found another classification failure of the old system — and at the same time one that nicely confirms our new analysis.

But closer inspection suggests we have been too quick. It is fairly easy to argue that at least some authorial markup in the logical domain is not a true or false report, and therefore not in the indicative mood. But despite the "resonance" mentioned above can we really accurately characterize the authorial use of `title` as an an imperative expression comparable to issueing a formatting instruction or some other command? I don't think so. The author is not commanding or instructing some words to be a title — she is making them a title.

However that last locution ("she is making them a title") sets us back on the right road — and the knowledgeable reader has probably already figured out where that road is taking us. The two features that we noted were characteristic of authorial markup are precisely the features that the British philosopher John Austin noted picked out a special class of linguistic utterances, which he called *performatives* [Austin 1962].

The clearest (and standard) example of a performative are the linguistic utterances used in "promising". When we say, in the first person present tense, "I promise . . . ", we are not reporting a fact about which we might be either correct or mistaken (although this is indeed what we would be doing if we were to say "He promised . . . " or "I promised . . . "). What we are doing instead is actually making a promise. That is, we are, through the linguistic event in question, actually promising, bringing about a promise, and not reporting the existence of one. Other illuminating examples of performatives are bequeathing, betting, naming (e.g. "I name this ship . . . "), marrying ("I take this woman . . . "), warning, etc. In every case Austin notes (a) that such performatives do not describe or report anything and are not true or false; and (b) that the uttering of the sentence is, or is a part of, the doing of the action that creates the thing in question. As Austin put it with respect to marrying: when a man says "I take this

Mood: . *Domain:*	**Imperative**	**Indicative**
Renditional:	**\<bold\>** *authorial*	**\<bold\>** *transcriptional*
Logical:	? **\<title\>** *authorial*	**\<title\>** *transcriptional*

Figure 3 | A possible classification of authorial markup (Problem 2)

woman to be my wedded wife . . . ", that man " . . . is not describing a marriage, he is indulging in one".

So it seems we now have another mood to distinguish, and therefore a more complicated, and less intellectually satisfying, matrix.

To be convinced of the distinction between the performative and the indicative, it sometimes helps to note that performatives are never strictly speaking true or false; there are many other ways for them to go wrong. In some cases the attempted act will actually fail to be accomplished, as when a marriage ceremony is performed by an unlicensed clergyman, or if the groom is already married. In those cases no marriage occurs because certain necessary background conditions were not met. In other cases the act actually succeeds but in an misleading way, as when when someone says "I promise . . . " without intending to keep that promise. In this case, unlike the two marriage cases, the person actually does succeed in promising (we couldn't say "don't make promises you don't intend to keep" if it wasn't possible to make such promises at all); and certainly the promiser does not tell a lie, strictly speaking, merely in saying "I promise . . . ". But it is nevertheless a deception: in virtue of the fact that saying "I promise . . . " is generally taken to justify the inference that the promiser intends to keep the promise — and in our case that inference is false (and a first person assertion of it by the promiser would in fact be a lie).

Generalizing on these consideration Austin identified three "conditions of felicity" for performatives:

1. There is an accepted procedure. (Marrying, naming, betting, etc. all require that certain social conventions and practices exist.)
2. The process is executed correctly. (Or else the attempt may fail, as in the case of marriage, above.)
3. The process is executed sincerely. (Or else the result is misleading, as in the case of the deceptive promise.)

Mood: . Domain:	Imperative	Indicative	Performative
Renditional:	`<bold>` *authorial*	`<bold>` *transcriptional*	**???**
Logical:	**???**	`<title>` *transcriptional*	`<title>` *authorial*

Figure 4 | A better classification of authorial markup (Problem 2)

Having noted the application of performatives to authorial markup, it is hard to resist looking for further parallels to Austin's felicity conditions to test our conjecture that authorial markup is similarly performative? So, as much for fun as for enlightenment . . . .

1. There is an accepted procedure
   . . . an element declaration in the applicable DTD
2. The process is executed correctly
   . . . the placement of the markup conforms to that declaration
3. The process is executed sincerely
   . . . no "tag abuse": the author cannot insert "title" markup around something that she does not intend to be a title simply in order to get the formatting that the expected processing gives to titles.

These crude parallels are as much for amusement than illumination, but they suggest the direction along which further inquiry could go.

Conclusion

Where are we now? Well there is bad news, and there is good news. The bad news is, as we said above, that if the authorial "title" is a performative, it still doesn't really fit in the "imperative and logical" slot that was so intriguingly empty. And that is simply because the semantics of imperatives and the semantics of performatives are quite different. It is one thing to imperatively order a promise (even of yourself), and another thing to promise; one thing to demand a title, another to indulge, as Austin might say, in a little titleing. So not only does the empty slot remain empty but we have a new (old!) kind of markup to work into the taxonomy.

The good news is that there are obviously a lot of very foundational issues in markup theory that we have only begun to uncover, and working these out should be fun as well as scientifically rewarding. "Speech act theory", the development of Austin's insights by recent linguistics, will certainly be of help here. I predict that we will not only require many new complexities and subtleties in markup classification, but that some of these elaborations will substantially complicate the formalization of markup semantics.

For instance, a recent effort to develop a formal account of the meaning of markup (led by Michael Sperberg-McQueen and including Claus Huitfeldt and the author of the present essay) uses a pure functional calculus combined with special inference rules (beyond the deduction rules of first order logic) to govern things like non-monotonic inheritance and other important logical features of markup meaning [Sperberg-McQueen, Huitfeldt, and Renear 2000]. But the formalization of expressions involving speech acts would seem to require modal

operators as well as the functional calculus, and various new relationships based on speech act modality would also need to be added as rules or axioms. In fact, the Sperberg-McQueen effort anticipates this sort of complexity and was careful to characterize markup not as "making a claim about a text", but as "licensing inferences about a text". Since non-assertive speech acts, such as promising, are typically conceptualized as licensing inferences even though not actually making assertions, this may allow the project of developing a markup semantics to get underway without taking on the full complexity of things. But even if this protection of the nascent project of markup semantics is successful, it will come a the cost of comprehensiveness: eventually a comprehensive treatment will require dealing with the complexities introduced by markup modalities.

However I'm inclined to suspect that the most difficult and consequential problems raised by the recognition that markup has modality and that some of it is performative, constitutive of the text it characterizes, will be new puzzles about just what markup really is, and in particular, when it is *about* a text and when it is *part* of a text . . . and when, and how, it may sometimes be both. [4]

Finally, I would like to update my terminology, which, although handy for this exposition, is unnecessarily idiosyncratic with respect to current work in speech act theory. So, going forward I will use the more common *illocutionary force* (a phrase Austin coined) instead of *mood*;, and I will follow John Searle's classification of illocutionary acts ([Searle 1969], [Searle 1979]). In Searle's terminology the moods which I have called *imperative*, *indicative*, and *performative* become *directive*, *assertive*, and *declarative*.

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4   Claus Huitfeldt [Huitfeldt 1995] first brought this last issue to my attention and Dino Buzzetti has emphatically reiterated the problem in several seminars I attended in the late 1990s (see his later treatments: [Buzzetti 1999], [Buzzetti 2000]). However it is not until after my recent reflections on the performative nature of some markup that I realized the significance of what they were trying to tell me. More recently Paul Caton has embarked on a rather extensive program to reconceptualize markup practices which takes up many of these topics (for early reports from this project see [Caton 1999] and [Caton 2000].

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