DYNAMIC CONTEXT PROCESSING

Ceyhun Aksoy
Hacettepe University

The idea that the context of an utterance may have dynamic properties is not new, as explicated in various works in quite different ways (please see Garnham 1987: 47; James 1890; McClelland & Rumelhart 1981). However, there still seem to exist problematic points in studying context under this assumption; below is an attempt to discuss some of these points briefly:

[1]The term *dynamic* refers to procedural state changes, rather than structural soundness; therefore, it should be possible to study context with models and methods similar to those used in studying utterances, totally new ways of research not necessarily being sought;

[2]An operational definition of the *relevance* of utterance units to contextual elements is needed;

[3]Reliable parametres have not yet been established for the observation / measurement of interactions among utterance and context elements.

The aim of the present study is to introduce a revised model of context processing, based on the assumption that the dynamic nature of a context which is continuous in an utterance segment is realised by the use of inhibitory vectors aimed at utterance elements as a result of the activation of object codes designated by context units (please consult Amari 1977; Grossberg 1980; McClelland & Rumelhart 1981). Activation with strict temporal parametres was previously shown to be effective on inhibitory processes at lexical, morphological, syntactic, semantic and pragmatic levels (Aksoy 1994: 76-156; Talaslı 1984).

The present study was designed to investigate a receiving system's construction of the context. As the usage of the term "construction" is to theoretically ignore the disagreement between the *given* versus *chosen context* views (please see Sperber & Wilson 1986: 132-134), a new form of approach was seen necessary.

Let us imagine a set of input items conceiving a domain {C} whose vectors terminate on a set of arguments {R}, causing inhibitory vectors from these points to control another set {R'}, comprised of the associates of {R}'s elements. Thus, any set {I} sharing arguments with {R}, even when $N_i = N_r$, will be unaffected since it does not receive any activation via {C}; consequently, the elements of {I'} will not be suppressed. Therefore, it can be said that {R} is *relevant to* {C}, while {I} is not. On the other hand, since {C} is also a result of such a control imposed by the set of real-input items on pre-existing patterns, it can be considered as a *construction*, rather than a choice or predictum. In this vein, it was assumed that the relevance/irrelevance of a set of arguments to {C} will be reflected in (i) the success to recall the elements of the set, and (ii) the speed with which recall occurs. Since these criteria suggest scalar values for measurement, context construction may be considered as either *proactive* or *retroactive*. With this model at hand, it was hypothesised that

[i] the sizes of the primer sets {R} and {I} being kept constant, fewer items are recalled from {R'} than from {I'}, due to inhibition of {R'} items;

[ii] recall using {I'} is faster (in milliseconds) than recall using {R'}, due to slow conduction across {R'} elements during recovery from inhibition;

[iii] the above predictions hold for both proactive and retroactive context formation.

Under these hypotheses, what has to be supported is a process like

{C}	{R} →*i* → {R'}		*no release, performance low & slow*
	{R} → *i* → {R'}	{C}	*no release, performance low & slow*
{C}	{I} → *i* → {I'}		*release, performance high & fast*
	{I} → *i* → {I'}	{C}	*release, performance high & fast*

Thus, inhibition is assumed to exist in all cases among primer and associate items. However, the presence of a relevant context is foreseen to maintain an existing inhibitory relation, whereas it is suggested that an irrelevant context causes a release from inhibition.

METHOD

Subjects. 14 female and 12 male students of the Hacettepe University Departments of Linguistics, English Language and Literature, and American Culture and Literature served as subjects. The age range was 21 - 23. The Ss were randomly assigned to experimental groups.

Design. The effects of the IVs *context type* (relevant, irrelevant) and *context position* (pre-priming, post-priming) on the DVs *recall rate* and *recall speed* were investigated using a 2 x 2 factorial design.

Materials. The test materials consisted of a relevant context (*çiftlik ... serin bir rüzgar ... yemyeşl çayırlar ...* / 'the farm ... a cool wind ... green meadows'), an irrelevant context (*okyanus ... serin bir rüzgar ... masmavi dalgalar ...* / 'the ocean ... a cool wind ... blue waves'), a primer set (*kedi* / 'cat', *inek* / 'cow', *horoz* / 'rooster'), and an associate set (*köpek* / 'dog', *öküz* / 'ox', *tavuk* / 'hen'). The primer and associate sets functioned as {R} and {R'} with the relevant context, and as {I} and {I'} with the irrelevant context, respectively.

Equipment. An IBM-compatible PC-386/40DX computer with green monochrome monitor screen was used for presentation and measurement. Test materials were presented and reaction times were measured using a Microsoft Quickbasic programme.

Procedure. The Ss were tested individually. The *proactive context* Ss were given the context at the beginning of the sequence, and *retroactive context* Ss, at the end. The context in either case was displayed for 5 secs. and the Ss were told to read it passively. The body of the sequence did not change; the Ss saw and repeated aloud the primer set for 3 secs., then had to count back by ones from a 3-digit number that was continuously displayed for 10 secs. for smooth STM decay. Afterwards, the associate set appeared for 3 secs., which the Ss again repeated aloud, followed by another 3-digit number from which the Ss once more counted back by ones for 10 secs. Then, a question mark appeared (the *retroactive context* Ss saw the context before this question mark), and the Ss had to press the space bar when they were ready to report back the associate set. The onset of the question mark started an internal chronometer programme, which was stopped by the S's pressing the space bar, and the reaction time was displayed on the screen, to be recorded by the experimenter. The S's recall items were recorded using a HI-TECH 2000 mini tape recorder.

RESULTS AND DISCUSSION

The data were evaluated using SPSS-PC+ version 5.01, through paired *t*-tests among design subgroups. The results have been summarised in the below tables:

Table 1. Difference-of-Means Between *Irrelevant-Proactive* and *Irrelevant- Retroactive* Contexts: Recall Performances

Variables	Number of Pairs	Corr.	p <	Mean	Std. Dev.	Std. Err. of Mean
Irrelevant-Proactive	6	-	-	2.5000	0.548	0.224
Irrelevant-Retroactive				2.3333	0.816	0.333

Paired Differences					
Mean	Std. Dev.	Std. Err. of Mean	t- value	df	p <
0.1667	0.983	0.401	0.42	5	0.695

Table 2. Difference-of-Means Between *Irrelevant-Proactive* and *Relevant- Proactive* Contexts: Recall Performances

Variables	Number of Pairs	Corr.	p <	Mean	Std. Dev.	Std. Err. of Mean
Irrelevant-Proactive	7	-0.125	0.789	2.2857	0.756	0.286
Relevant-Proactive				0.7143	0.756	0.286

Paired Differences					
Mean	Std. Dev.	Std. Err. of Mean	t- value	df	p <
1.5714	1.134	0.429	3.67	6	0.010

Table 3. Difference-of-Means Between *Irrelevant-Proactive* and *Relevant- Retroactive* Contexts: Recall Performances

Variables	Number of Pairs	Corr.	p <	Mean	Std. Dev.	Std. Err. of Mean
Irrelevant-Proactive	6	-0.728	0.101	2.5000	0.548	0.224
Relevant-Retroactive				1.1667	0.753	0.307

Paired Differences					
Mean	Std. Dev.	Std. Err. of Mean	t- value	df	p <
1.3333	1.211	0.494	2.70	5	0.043

Table 4. Difference-of-Means Between *Relevant-Proactive* and *Relevant- Retroactive* Contexts: Recall Performances

Variables	Number of Pairs	Corr.	p <	Mean	Std. Dev.	Std. Err. of Mean
Relevant-Proactive	6	0.434	0.390	0.6667	0.816	0.333
Relevant-Retroactive				1.1667	0.753	0.307

Paired Differences					
Mean	Std. Dev.	Std. Err. of Mean	t- value	df	p <
-0.5000	0.837	0.342	-1.46	5	0.203

While significant differences were found between *irrelevant* and *relevant context* data, *proactive* and *retroactive context* data did not appear to be significantly different. With these results, there seems to be sufficient support for the first and third research hypotheses stated above. The second hypothesis was tested in a similar way, as summarised below:

Table 5. Difference-of-Means Between *Irrelevant-Proactive* and *Irrelevant- Retroactive* Contexts: Reaction Times

Variables	Number of Pairs	Corr.	p <	Mean	Std. Dev.	Std. Err. of Mean
Irrelevant-Proactive	6	0.347	0.501	946.333	51.976	21.219
Irrelevant-Retroactive				897.833	18.324	7.481

Paired Differences

Mean	Std. Dev.	Std. Err. of Mean	t- value	df	p <
48.5000	48.751	19.903	2.44	5	0.059

Table 6. Difference-of-Means Between *Irrelevant-Proactive* and *Relevant- Proactive* Contexts: Reaction Times

Variables	Number of Pairs	Corr.	p <	Mean	Std. Dev.	Std. Err. of Mean
Irrelevant-Proactive	7	-0.355	0.435	941.000	49.501	18.710
Relevant-Proactive				1403.857	23.731	8.969

Paired Differences

Mean	Std. Dev.	Std. Err. of Mean	t- value	df	p <
-462.857	62.028	23.444	-19.74	6	0.0001

Table 7. Difference-of-Means Between *Irrelevant-Proactive* and *Relevant- Retroactive* Contexts: Reaction Times

Variables	Number of Pairs	Corr.	p <	Mean	Std. Dev.	Std. Err. of Mean
Irrelevant-Proactive	6	-0.577	0.230	946.333	51.976	21.219
Relevant-Retroactive				1498.000	107.350	43.825
Paired Differences						
Mean	**Std. Dev.**	**Std. Err. of Mean**	**t- value**	**df**	**p <**	
-551.667	143.767	58.693	-9.40	5	0.0001	

Table 8. Difference-of-Means Between *Relevant-Proactive* and *Relevant- Retroactive* Contexts: Reaction Times

Variables	Number of Pairs	Corr.	p <	Mean	Std. Dev.	Std. Err. of Mean
Irrelevant-Proactive	6	0.131	0.805	1400.333	23.905	9.759
Relevant-Proactive				1498.000	107.350	43.825
Paired Differences						
Mean	**Std. Dev.**	**Std. Err. of Mean**	**t- value**	**df**	**p <**	
-97.6667	106.882	43.635	-2.24	5	0.075	

The results obtained with reaction times appear to support the second and third research hypotheses, in that the differences among *relevant* and *irrelevant context* data were significant, whereas those among *proactive* and *retroactive context* data weren't, although a near-significance is clearly seen in both of these latter groups (however, the reversal in the standard deviations as to the proactivity / retroactivity is notable!).

CONCLUSION

There seems to exist an initial support for the dynamic context processing model introduced in this study. The assumption that context is neither given nor chosen, but actively constructed *during* utterance analysis seems established — due to the presence of context retroactivity observed in our research. More general assumptions may now be put forth; e.g. views like context construction is object-oriented and that contextual units are content-addressable (see Blakemore 1992: 17) can be considered as tenable hypotheses. Using well-established neural models and techniques that can efficiently manipulate short and long-term memory processes seems promising in this respect.

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