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Process types in Persian-speaking aphasic discourse: a systemic functional approach

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Abstract

This research explores the verbs used in aphasic spoken data by using Hallidayan systemic functional linguistic framework and compares them with the type of verbs used by healthy subjects. Persian aphasia test was used to recruit eight right-handed aphasic patients (mean age of 57.5 years) based on convenient sampling, and there was also another control group of six healthy participants (mean age of 52.2±2.04 years). They were interviewed orally and the process types in each group were determined and compared. These processes were compared to each other by using descriptive statistics characteristics such as the mean and standard deviations of the processes. In order to study descriptive results more precisely, statistical inference was used and 'test for comparing two binominal populations' was implemented to analyze differences of the process proportions between two groups. Results showed that aphasics significantly used more material processes than normal individuals ($p=0.021$); on the other hand, aphasics significantly used less relational ($p=0.012$) and behavioral ($p=0.018$) processes than normal individuals. There could be seen no significant differences for the use of mental, verbal, and existential processes between the two groups ($p>0.05$). Relying more on some processes and less on some others in aphasics implies the linguistic areas where they have more problems with and suggests where they base their speech in the process of recovering linguistic abilities. These findings have implications for both linguists and language pathologists.

Keywords: aphasic patients, Halliday, Persian, process verbs, systemic functional

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1. Introduction

Verbs are very important in the structure of sentences since they are the realization of the basic meaning process contained within a sentence (Armstrong, 2005b); regarding the related arguments and other constituents, verbs incorporate lots of information. Moreover, verbs are the determining governors of the contents of sentences (Tesnière (1959), Starosta (1988), Groß and Osborne (2009). Of course, cognitive approaches to learning refer to this constituent differently (Esmaeeli & Rashidi, 2021).

In comparison to other constituents, verb production difficulty has received attention prompted by the agrammatic aphasic speakers. This difficulty is multifaceted; for example, Zingeser and Berndt (1988) contend that the semantic system and the lexicon link are affected by both semantic and grammatical class information. On the other hand, according to Saffran, Schwartz, and Marin (1980) the problems with "sentence production and comprehension of the patients" are because of the verb deficit in accessing its arguments. Along the same line of research, the semantic complexity of verb argument structure which is used in the agrammatic speakers' discourse was examined by Thompson, Lange, Schneider, and Shapiro (1997); they showed that the increase in the complexity of argument structure caused an increase in the retrieval difficulty. Kim and Thompson (2000) also showed that when the number of verb arguments increases for the agrammatic patients retrieving becomes more difficult. They argue that this occurs maybe because these additional arguments which lead to more related syntactic information, cause the verbs to be more complex. The same results were reiterated by Kim and Thompson (2004), while they studied the effect of both syntactic and semantic features of verbs.

Contrastively, Breedin, Saffran, and Schwartz (1998) studied the production of verbs based on a decompositional view of verb representation. Breedin et al. considered simple or complex verbs, semantically. Their findings showed that retrieving more complex verbs was easier for the aphasic patients. Another pertinent theory is called the Argument Structure Complexity Hypothesis (ASCH) put forward by Lee and Thompson (2004) and Thompson (2003). It maintains that verb complexity, manifested "either as a high number of arguments or a lack of direct mapping of verb arguments to sentence slots", leads to more difficulty in verb production. It predicts that producing one-argument verbs can be more difficult than two-arguments and that "unaccusative verbs" can be more problematic "than

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unergative verbs". Such effects are reported in other languages including Hungarian and German (Kiss, 2000; De Bleser & Kauschke, 2000).

As emphasized in Systemic Functional Grammar (SFG), the "functions" of a language in the internal organization of that language are as important as the "syntactic and lexical-semantic rules" (Halliday, 1985, cited in Armstrong 2001: 1031). From a functional perspective, investigating the aphasic speaker's verb usage may add to our knowledge of how aphasic speakers might perform in their everyday language; moreover, it can also offer an additional "categorization system which will shed more light onto the differential usage of verbs in aphasia by including both structural and discourse features" in a single analysis system (Armstrong, 2001).

If we regard the clause as an exchange, there is a system of grammatical choice TRANSITIVITY system or PROCESS TYPES (Eggins, 2004). These processes (realized as verb groups) are categorized into six types: material, mental, relational, behavioral, verbal, and existential. Material processes are concerned with our experience with the material world referring to performing an action or happening of an event; examples could be as creating, writing, painting, and going, etc. (Halliday and Matthiessen, 2014) e.g., *I washed the dishes*. Mental clauses, on the other hand, are concerned with encoding meanings of our thinking or feeling or "our experience of the world of consciousness" (Eggins, 2004); they are clauses of sensing, examples of which include understand, think, want, and love which helps to express personal feeling and opinions e.g., *she hates me*. Relational processes serve to characterize and identify. The relation between two things or phenomena, as Halliday and Matthiessen describe, is expressed with relational processes and is normally realized through the verb *be* in the simple present or past. They allow us to describe "factual aspects of entities or circumstances" (e.g., *I am fourteen*) or enable a speaker "to evaluate" (e.g., *it was strange*). The "meanings they involve are central to the expression of identity" and seem to be challenging in aphasic patients (Armstrong, 2005b). Behavioral processes typically pertain to "human physiological and psychological" behavior such as crying, breathing, sneezing, and laughing. Verbal processes are normally used in clauses of saying and its synonyms, e.g., *I talked to him*. Finally, existential processes "represent that something exists or happens. Existential clauses typically have the verb *be";* other examples would be *exist, happen*, and *flourish* to mention a few (Halliday and Matthiessen, 2014); e.g., *there is a holiday in this week.*

SFG analyzes meaning at three different lines, interpersonal, textual and ideational metafunctions; each kind of meaning is embodied in the structure of a clause (Halliday and Matthiessen,

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2014). The application of SFL theory to aphasia can be traced back to Armstrong (1991) who highlighted the potential of cohesion analysis in the investigation and treatment of aphasia. She suggests that patients' awareness of the cohesive ties and devices may assist in the treatment of connected speech as it occurs in everyday contexts and in the discussion of real-life topics of interest; therefore, this kind of analysis opens a new window, as she believes, for clinicians to look at and treat the patients' language (p. 49). Ferguson (1992), on the other hand, seeks to explore the role of a systemic-functional approach in analyzing the interpersonal aspects of aphasic patients' speech. She believes that her methodology allows considering both the strengths and weaknesses of aphasic language (p. 290). Notwithstanding, the function of verbs regarding aphasia was attended to quite late; see for example Thompson et al. (1997) as another basic work.

Armstrong (2001), like this paper, used experiential metafunction to investigate the formation of meaning in discourse by aphasic patients and compare her findings with the discourse of normal people. The results show that normal participants, when describing a scene, use more relational processes than the aphasic patients and generally the pattern of verb usage is different among them (p. 1037). Later, Armstrong (2005b) examined the "ability of aphasic speakers to express opinions, feelings, and attitudes through the use of verbs" which are connected with mental processes and personal evaluation revealing that they had less ability in this regard and they also inclined to use "less lexical diversity and more general and high-frequency mental verbs". Ferguson and Armstrong (1997) discuss the wide range of linguistic resources available to aphasic speakers which help them to communicate other aspects of interpersonal meanings within contexts (p. 1092). They refer to the clinical potential of the systemic functional approach and follow a semantic therapy content.

It appears that more recent studies such as Armstrong (1995, 2005a, 2005b) and Armstrong, Ferguson, Mortensen, and Togher (2005) not only consider theorizing and treatment but also step further and look for higher levels of therapy and even try to advance more meticulous definitions of language disorder. The different patterns of verb usage by aphasic patients mainly highlight "the way in which a lack of certain verbs can lead to the absence or at least restricted incidence of certain types of discourse functions, e.g., opinions, evaluations, descriptions, or even limited text structure" (Armstrong, 2001). A text which mostly relies on material verbs, for example, "restricts the speaker's meanings to the actual occurrence of events, with little room for reflection on the speaker's perspective of those events" (Armstrong, 2001).

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This study draws upon SFG (as suggested in Halliday and Matthiessen, 2014) as its theoretical basis to analyze process variations. Since there might be some discrepancies in Persian data concerning the classification of verbs according to Halliday's categorization, comparisons like this can highlight the possible differences while shedding light on the universality of the application of the theory. Reflecting on the ease or difficulty of the types of verbs, for example, should be examined in more research on different languages to have a better sketch of the languages under study; this, on the other hand, contributes to a better understanding of the functions of verbs in aphasic discourse. This study is also the first one to investigate the verb types in the discourse of Persian speakers with aphasia and it has the potential to highlight the functional patterns existing in the semantics of Persian aphasic verbs which could also then contribute to an international discussion on cross-linguistic differences or similarities between the discourse of Persian and English speakers.

Our review of the literature clearly suggested the scarcity of Persian studies of aphasia (or other linguistic deficits) based on SFG. Tafreshi (2009), which is among the very few relevant studies, analyzed the written discourse of students with intellectual disability according to experiential metafunction. The results showed that primary school students mostly used relational and material processes in their written discourse while guidance (junior high) and high school students used more material, behavioral, mental and verbal processes. Inasmuch as, to date, there appears to be no comprehensive investigation of the transitivity system, and especially verbs, among Persian aphasic patients, the objective of this study is to analyse aphasic discourse to grasp a clearer picture of the process type choices. The main question explored in the current paper is as follows:

What are the similarities and differences between aphasic patients and normal participants in their verb choice patterns?

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2. Method

2.1 Participants

Eight right-handed aphasic volunteers, with a mean age of 57.5 years, were selected by convenient sampling out of 100 patients who had been referred to Tabassom Clinic in Tehran, Iran, for six months. The criteria for inclusion in the sample were as follows: monolingual Persian speaker, sufficient hearing and seeing ability to do the linguistic tasks, righthandedness, no records of stroke other than their current

condition, stroke lesions limited to the left hemisphere only, and minimum of 10 months since onset. Any history of dementia, wide white matter lesions, psychological disorder, and addiction would disqualify the patients for inclusion in our research sample. Utilizing the Persian Aphasia Test (Nilipour, 1991), all the participating patients were diagnosed with Broca's aphasia. All patients and/or families gave their informed written consent.

Table 1

Aphasic Patients' Demography

Participant	Sex	Years Education	Age
A1	M	16	53
A2	F	16	75
A3	F	8	36
A4	M	8	42
A5	M	12	50
A6	F	16	64
A7	M	12	67
A8	F	16	73
Mean ± Sd		13±3.54	57.5±14.43

There was also another group of six non-brain-damaged normal participants whose mean age (52.16±17.35 years) and education (13.3±4.32 years) were close to that of the experimental group. They were all right-handed monolingual Persian speakers.

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Table 2

Non-brain-damaged Participants' Characteristics

Participant	Sex	Years Education	Age
N1	M	16	46
N2	M	12	65
N3	F	16	37
N4	M	6	75
N5	M	12	60
N6	F	18	30
Mean ± Sd		13.3±4.32	52.16±17.35

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2.2 Procedure and data collection

Language variable, especially the proportion of process types in each group, was the only variable in this research. After visiting the patients and a neurologist's confirmation that there was a left hemisphere deficit due to stroke, the Persian aphasia test (1991) was administered to determine the appropriate candidates. All fitting participants were asked to take part in a one-session interview with the researchers each at a time. The total circumstances of the interview were the same for both groups.

To collect needed data containing different genres such as casual conversation, recount and picture sequence description, voice-recorded interviews were gathered in a single session for each participant. The sessions for eliciting spontaneous speech would start with greetings, asking the participants' ideas about the traffic and weather in the capital city, conversing about the New Year's customs, recounting an interesting memory and asking about what participants did that same day; narratives were also elicited through picture sequence cards (see appendix).

The obtained conversation samples were transcribed for linguistic analysis. Then, the verbs were identified, analyzed, categorized, and counted with reference to the taxonomy elaborated in the introduction section. Since there was no fixed categorization of Persian verbs in terms of SFL in previous

literature, the researchers had another rater, who was familiar with SFL, rate the data again. Then, the interrater reliability was assessed to be 89%.

2.3 Data analysis

The categorized processes were compared to each other using descriptive statistics including the means and standard deviations of the processes. In order to study descriptive results more precisely, statistical inference was utilized and a "test for comparing two binominal populations" was implemented to analyze the process proportions between the two groups. Minitab 17 Statistical Software (2010) was used to analyze the data and p-value of <0.05 was considered statistically significant.

Table 3

Aphasic patients' detailed mean and proportion of the processes

	existential	Relational	behavioral	verbal	Mental	Material	Total
A1	1	4	1	3	3	13	25
A2	1	3	1	1	1	21	28
A3	1	4	1	1	0	20	27
A4	1	4	0	1	1	4	11
A5	0	5	0	1	2	6	14
A6	0	2	0	0	0	13	15
A7	1	5	1	0	1	12	20
A8	1	3	0	1	1	7	13
Total	6	30	4	8	9	96	153
Proportion of each process to all processes	0.039	0.196	0.026	0.052	0.058	0.672	
Mean	0.75	3.75	0.53	1	1.125	12	
Standard deviation	0.62	1.03	0.7	0.9	0.99	6.2	

3. Results

The number of recognizable processes obtained from the aphasic patients' conversations was 153, the details of which can be seen in Table 3. To determine the means in the table we divided the total sum of

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each process type to the number of participants (8). The proportion of each process to the total number of processes was also calculated.

As can be seen from table 3, the material process has the highest mean and proportion (12 and 0.627) among other processes. The other process types are relational (mean=3.75; proportion= 0.196), mental (mean= 1.125; proportion= 0.058), verbal (mean= 1; proportion= 0.052), existential (mean= 0.75; proportion= 0.039), and behavioral (mean= 0.53; proportion= 0.026). The frequency (total sum of 336 processes), mean, and proportion of each process to total processes were also calculated for normal participants' conversation, the details of which can be seen in Table 4. To determine the means in the table, the total sum of each process type was divided into 6 (the number of participants).

Table 4

Non-brain-damaged detailed mean and proportion of the processes

	existential	Relational	behavioral	verbal	mental	Material	Total
N1	1	3	2	2	3	38	49
N2	0	17	2	1	2	18	40
N3	4	32	6	4	7	45	98
N4	3	23	5	1	0	28	60
N5	2	17	3	0	2	15	39
N6	1	8	6	1	4	30	50
Total	11	100	24	9	18	174	336
Proportion of each process to all processes	0.032	0.297	0.071	0.026	0.053	0.517	
Mean	1.8	16.6	4	1.5	3	29	
Standard deviation	1.4	10.3	1.8	1.3	2.3	11.4	

As can be seen from the table, the material (mean=29; proportion= 0.517) and relational (mean=16.6; proportion= 0.297) processes have again the highest frequency and proportion among other processes. However, the third and fourth types of processes are behavioral (mean= 4; proportion= 0.071) and mental (mean= 3; proportion= 0.053), respectively. The existential process (mean= 1.8; proportion=

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0.032) has a comparable status among other processes as compared to aphasic patients while verbal (mean= 1.5; proportion= 0.026) has the lowest proportion which is different from our experimental group. The schematic comparison of the means obtained from the two groups can be seen in Figure 1.

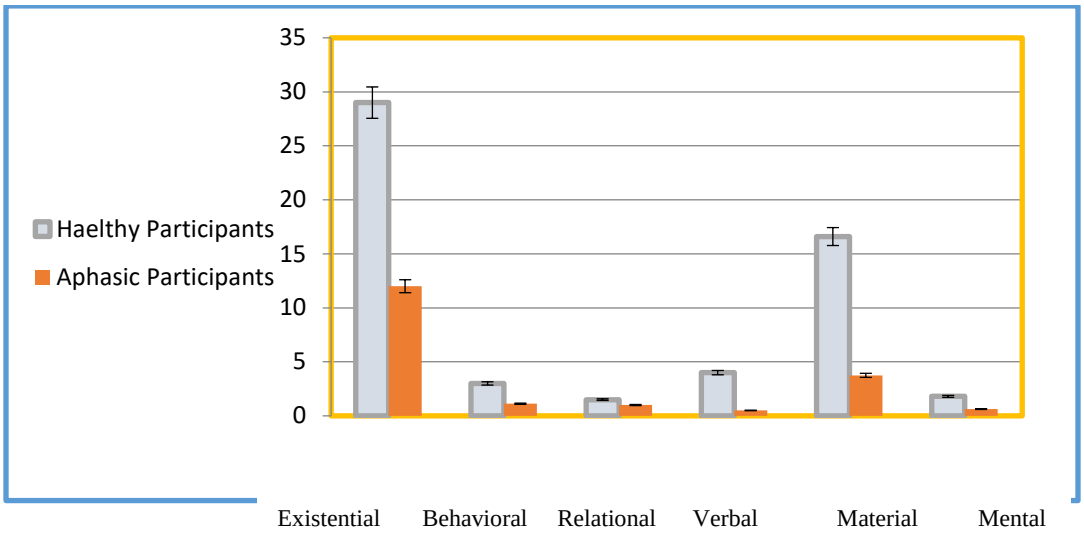

Figure 1. Comparison of the means obtained from the two groups

Therefore, the mean order of process types among normal participants is,

Material> Relational> behavioral> mental> existential> verbal

While the mean use of process types among aphasic brain-damaged participants is,

Material> Relational> mental> verbal> existential> behavioral

The semantics and morphology of the verbs used in aphasic discourse demonstrate other interesting features which are not the primary focus of the current work but can give the readers some ideas about the formation and structures of verbs in Persian. Cliticized copula and omission of auxiliary are recurrent in the data. Examples are as follows:

1. *a) Mæn bozorgtær-æm.*

   Lit.[2] I older-am

   b) t∫*ahar ruz mande* [æst]

   Lit. four day remained [is]

[2] Some of the equivalents are literally (Lit.) glossed and others are freely translated for better comprehension of the readers

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The other prominent feature of Persian aphasia speech is the high frequency of one-argument verbs while no instances of tree-argument verbs were found, for example:

2. *a) ambulans umæd*

   The ambulance came.

   *b) der*æxt ʃekæst

   The tree broke.

   c) pærænde zendegi mikærd

   The bird was living.

Among these one-argument verbs, the reiteration of the light verb 'kærdæn' (which means roughly *to do* or *to make* with opaque referential meanings) is very interesting. This verb in the data is frequently used as a complete verb (contrary to its normal usage in everyday language). Its referential opacity helps it to be replaced with many other verbs that are not accessible for the patients.

3. *a)* nær*deban dorost* ***mikone***

   He makes a ladder.

   b) sæbzi dorost ***mikone***

   S/he makes vegetable.

   c) *indʒa tʃiz* ***kærd***

   S/he did here.

Inflectionally, verbs produced by the aphasic patients normally show no problems in their conjugations in our data. This is while normal participants used way more compound and complex sentences in comparison to the patients. On the other hand, they used more (unnecessary) descriptions, particularly in the form of introductions and opinions (see example 4).

4. /bær*a*ye læhze s*a*l fælsæfei vodʒud d*a*re ke hær s*a*l be x*a*tere gærdeʃe zæmin zæm*a*n tæhvile s*a*l no motef*a*vet miʃe/.
   There is a philosophy for the exact time of New Year that every year, because of the earth's rotation, this time would be different.

Most of the verbs in aphasic speech were either third person singular or plural and are used more frequently. The aphasic speakers, compared to their non-brain-damaged counterparts, have less "lexical

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diversity" and use "more general and high-frequency verbs", e.g., do, get, make, take (Armstrong, 2005b: 285). Their sentences were generally "simpler, shorter and without much structural elaboration" (Durks, 2002: 291).

To compare the proportional differences among the process types and the related significance of these differences more precisely, statistical inference was used and "test for comparing two binominal populations" was implemented to analyze the process proportions between the two groups. Table 5 shows the result of this comparison.

Table 5

Comparison of process proportions between the two groups

	Brain-damaged participants	Normal participants	p-value
Proportion of material process to all processes	0.631579	0.517857	0.017*
Proportion of relational process to all processes	0.197368	0.297619	0.014*
Proportion of mental process to all processes	0.059211	0.053571	0.804
Proportion of verbal process to all processes	0.052632	0.026786	0.199
Proportion of behavioral process to all processes	0.026316	0.071429	0.018*
Proportion of existential process to all processes	0.032895	0.032738	0.993

* indicates significant difference

The results show significant differences in the use of material, relational, and behavioral processes between the two groups ($p<0.05$) while there can be seen no significant differences in the use of mental, verbal, and existential processes between the two groups ($p>0.05$). As the data suggest in Table 5, aphasic patients use significantly more material processes than normal individuals ($p=0.021$); on the other hand, aphasic patients use significantly fewer relational ($p=0.012$) and behavioral ($p=0.018$) processes compared to normal individuals.

4. Discussion

Results suggest some differences in the aphasic speakers' verb patterns in comparison to normal speakers in the same situation. Relying more on material processes in aphasic patients can lead us to conclude that

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they, functionally, focus more on the events or because they are concerned with our experience with the material world; the fact that material processes seem to be easier may lead the speakers to use them more often compared to the processes involving problematic circumstances and attributes. In agreement with the present proposal, Tafreshi (2009) and Armstrong (2001) found the same emphasis among aphasic patients which confirms the selection of the same verb type cross-linguistically.

The findings of the current research regarding the average use of relational and material processes are in line with the results of Armstrong (2001) in the English language, that aphasic patients relatively use more material processes and less relational ones in comparison to normal participants. As Armstrong (2001) suggests, relying more on processes like material among aphasic patients could be due to problems in lexical access, attributable to the argument structure of the verbs; this also could be related to other wider cognitive problems such as focusing more on the event itself and sometimes having problems with abstract processes including relational processes. This problem could also justify the limited use of behavioral processes among head-damaged aphasic patients.

On the other hand, using relational and behavioral processes appeared to be more challenging for aphasic patients hence fewer descriptions and evaluations are used in their speech; this is most probably because, firstly, they are more abstract, and secondly, there would be some limitations accessing other key elements required for these processes. This pattern was consistent with Armstrong's (2005b) study which suggests difficulty with roughly the same verb types. For instance, one might have a problem accessing the noun groups acting as circumstances as depicted in the following instance:

- The car was in the [garage].

Or they can have a problem accessing the adjective acting as an attribute in the following instance:

- That man was very [angry].

Therefore, the gravity of lexical access and the argument structure may dissuade them from using such clauses at all or use them limitedly. This finding is in line with the Thompson et al. (1997: 486) findings, where the authors concluded that verb retrieval difficulty increased “as the number of arguments associated with the verb increased”, suggesting that agrammatic aphasic patients may have disruptions either in the lexical-syntactic representation or in access routines to the lexicon of the verb during production tasks (as reiterated in Kim and Thompson, 2000 & 2004). The abstractness of argument

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structure and the resulting struggle with the arrangement of arguments while production had been an issue in other studies (Marshall, Chiat & Pring, 1997).

In contrast with the present argument, other investigators (e.g. Breedin et al., 1998 as cited in Armstrong 2001: 1030) found that aphasic patients "predominantly used low-frequency, semantically complex verbs in their narratives", suggesting that such patterns are because "additional semantic information" might facilitate retrieval. In other studies, Thompson (2003) and Lee and Thompson (2004) expect that the production of verbs with one argument and unaccusative verbs is more difficult than verbs with two arguments or unergative verbs.

On the other hand, our data showed no significant difference between the two groups in using existential processes which can be attributed to scarcity of this process in the obtained data set. Regarding the mental and verbal processes, it should be noted that the use of these processes points to some differences, but the differences are not statistically significant. Further research with a higher number of samples can deal with these kinds of variations. Limited sample size in most aphasia studies has affected/constrained (the generalizations made by) the researchers because social and psychological issues and constraints are very likely to hinder the patients and/or their families from willingly participating in research studies.

To answer the research question of this study, it can be stated that the semantic pattern of the verbs is different in aphasic patients as compared to normal participants; it can, consequently, lead to limited communicative functions in some special kinds of genres which are of interest to both linguists and language pathologists. Notwithstanding most research studies which analyze aphasic discourse based on the deficiencies and avoidances, the alternative view offered by SFG requires focusing on the linguistic areas in which aphasic patients feel stronger rather than just capitalizing on their weak points. It means that we can analyze the language resources that aphasic patients still have access to (e.g., focusing on verb types that seem easier to them) and the way they access these resources, consciously or unconsciously, to compensate for their shortcomings; moreover, focusing on more concrete concepts in language therapies would be a justifiable recommendation. Although there is still a long way to substantiate many of these claims, several of the aforementioned findings and conclusions are reiterated in the extant literature (cf. Armstrong, 2001 and 2005a).

Other physiological explanations have provided for the diversity of verb usage among aphasic patients; for example, the results of Binder, Westbury, McKiernan, Possing, and Medler (2005)'s study

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show overlapping but partly distinct neural systems for processing concrete and abstract concepts, with greater involvement of bilateral association areas during concrete word processing, and processing of abstract concepts almost exclusively by the left hemisphere. The patients in our study also were all left-brain-damaged.

The evidence such as our data, focusing on different patterns of verb usage by the aphasic patients, brings into view how a lack of certain verb types (e.g., focusing more on material) can result in "the absence or restricted incidence of certain types of discourse functions, e.g., opinions, evaluations, and descriptions (in the form of an impoverished introduction)", or even limited text structure with simpler, shorter sentences (Armstrong, 2001). Relying more on material and less on behavioural verbs, on the other hand, "restricts the speaker's meanings to the actual happening of events", restraining the occurrence of "speaker's own perspective" and descriptions of the events (Armstrong, 2001: 1037) which can also be attributed to the restricted use of relational processes among the aphasic patients.

5. Conclusion

Approaches other than formal grammar, including SFG, enable researchers to analyze the linguistic ability of aphasic patients in different situations and contextual variables which can help clinicians to have a better picture of the patients' linguistic capabilities and diagnose their strengths and weaknesses. The differences in the dominant, exploited verb patterns in Persian and the discerning potential bestowed by SFG are among the most important outcomes of the current work.

Findings of this nature can assist us in providing a better picture of ideational and experiential patterns among Persian patients; it can, in turn, have implications for clinicians in manipulating the current tests or therapies in order to help their patients reach their communicative goals more easily. When an index of different types of verb usage is found, such results can be used in treatment; such focus on specific patterns can lead us to the broader range of meanings which seems critical for people with aphasia needs in everyday life; therefore, such analyses can add to the assessment and treatment of Persian aphasic discourse. Since there have been very few studies in Persian, it is suggested that further research be conducted with a larger sample size and various cases of aphasia patients; furthermore, such studies are recommended to focus on other linguistic aspects like cohesion analysis, and interpersonal and textual metafunctions, among others.

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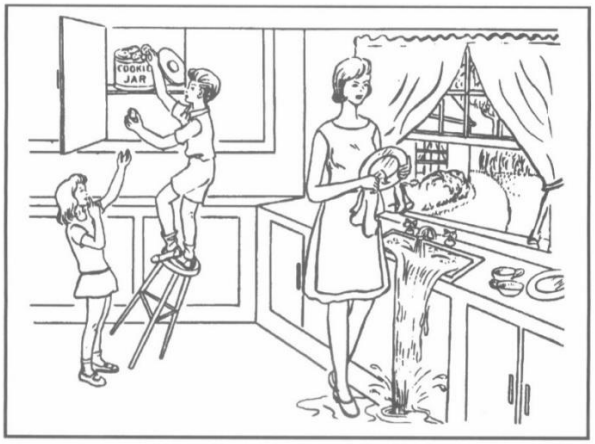
Appendix

Serial cartoon cards (Nilipour, 1991)



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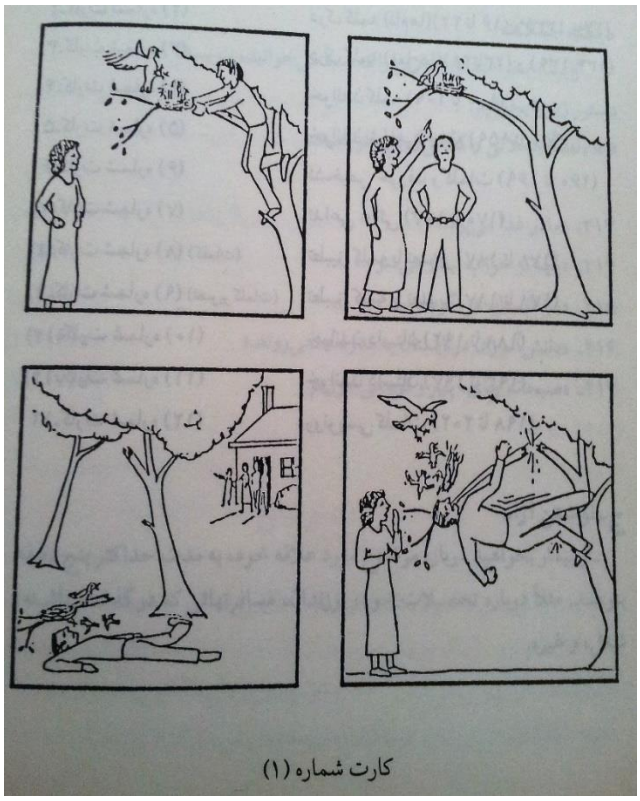

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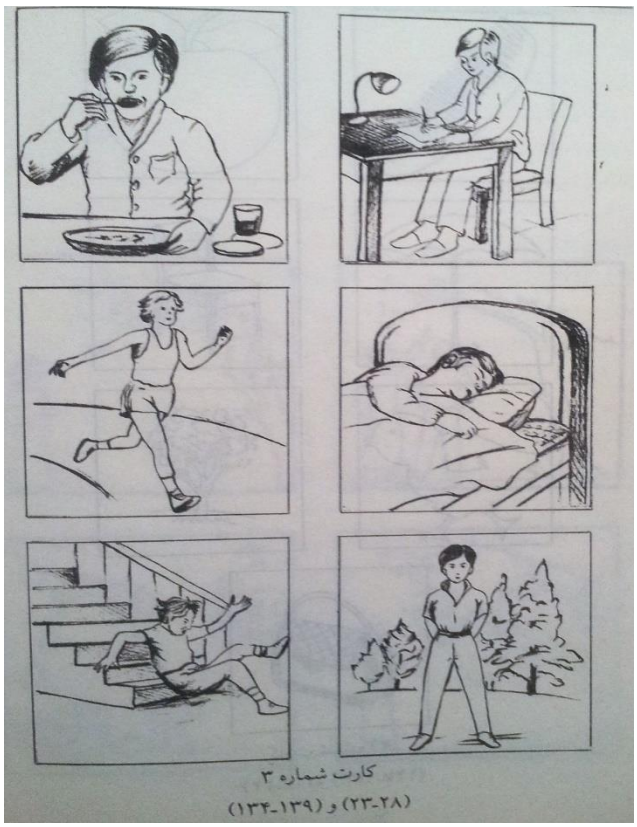

کارت شماره ۳
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