

## AN INTERCULTURAL STUDY ON PERCEIVING EMOTIONS IN VOJVODINA THROUGH THE EMOTIONAL STROOP TASK<sup>1</sup>

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*The aim of this research is to map the possible differences between monolinguals and bilinguals from Vojvodina in their emotional functioning. Ethnically, the dominant group living in Vojvodina is Serbian, which uses Serbian language, but there is a minority group which mostly uses Hungarian in family and educational settings. This way bilinguals from Vojvodina are mostly using Hungarian as a dominant language, but they are under a powerful impact of Serbian from their early childhood years. In many cases the language of education in bilinguals is mixed in the sense that they go to Hungarian secondary school and then to Serbian university (or the opposite). In the psychology of bilingualism there is a current debate about the structure of the emotional world of a bilingual person. It is still an open question whether the emotional words have the same intensity in the mental lexicon of the mother tongue and the second language.*

*Many researchers have the view that the mother tongue is the language that dominates upon the emotional expressivity. In our research we used a new version of the emotional Stroop task with participants who are now studying either in Serbian or in Hungarian and are Hungarian monolinguals or Hungarian-Serbian bilinguals. We wanted to investigate the question of emotional charge of these two languages. Daniel Algom and his colleagues inspired us, because they have modified the emotional Stroop task to improve it by using two-word idiomatic expressions. Their aim was to match the two types of words, the neutral and the negative case on all confounding characteristics. It is well known that extraneous variables have a high impact on results of the emotional Stroop task, as for example frequency or word length. Using expressions with the same target words with neutral or negative prime words Algom et al. managed to eliminate this obstacle. We selected Hungarian and Serbian two-word expressions, matched in translation, to see whether we can find the emotional Stroop interference: a slowdown effect for the negative words compared to their neutral counterparts in Vojvodinian*

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*participants. Our results did not show the Stroop interference effect, but we have found differences between the monolingual and bilingual group.*

**Keywords:** emotional Stroop task, bilingualism, monolingualism, Hungarian language, Serbian language

The relationship between emotions and multilingualism has been studied from different psychological perspectives in the last decade utilizing a range of methodological solutions: from introspection to various experimental designs (Deweale, 2008; Stepanova Sachs & Coley, 2006).

The aim of these inquiries was to map the interactions between the first and second language of bilinguals and their affective functioning to find the emotional correlates of the two languages. Most studies dealt with the emotional sphere in terms of representation, processing, translatability (Pavlenko, 2006a:xiii) and perceived emotional weight (Deweale, 2008) in the first and second language.

Although *Besnier* (1990:431) says that affect is never absent from interactions, there is some evidence, mostly from psychoanalytic context (Pavlenko, 2006b:21) that the first language is more emotional than the second: for example it is shown that anxiety reaches higher levels in the mother tongue opposed to moments of bilingual second language use when the person is more detached and less anxious.

Marian and Kaushanskaya (2005) wanted to investigate the interplay between language, autobiographical memories and the self in bilinguals. An explicit definition of the autobiographical memory does not exist, but Holland and Kensinger (2010) gave a simplified specification of the autobiographical memory as a database of knowledge about ourselves. Marian and Kaushanskaya's results (2005) about these personal memories suggest that in a bilingual person the cognitive style is affected by and varies depending on the language in use. The authors assume that the bilingual self is mediated by the actual language mode: through first or second language use cultural effects flow in. This results in regulating cognitions and self-construal in bilinguals.

As we can see scientific knowledge about human nature and personality delineates an utterly intertwined picture. Complex interactions of language, cognition, emotion, memory and self-representation are present in our everyday behavior.

In the last few years an often used experimental method of assessing emotions in bilinguals is the emotional Stroop paradigm (Sutton et al., 2007). This task supposedly measures selective attention. Through the experiment the emotional processing interferes with the semantic process of reading (Urbán & Dúll, 2008) and the task is usually used to compare the automatic emotional activation of the first and the second language words in bilinguals (Eilola, Havelka & Sharma, 2007:1071).

Using the emotional Stroop paradigm a recurring result is that negatively charged words are processed slower and the reaction time is longer for these words, than for neutral or positive ones. It is assumed that the negative, e.g. fearful or threatening information grabs attention (see Eilola, Havelka & Sharma, 2007).

Regarding bilinguals Harris et al. (2006) have found that there is a reduced emotional activation in the second language compared to the first – in cases when there is no early learning of the second language. They say that emotional contexts of early childhood are crucial for language emotionality, because of the development of emotion regulating systems.

Eilola, Havelka and Sharma (2007) used the emotional Stroop task to study activation of emotional contents in bilinguals first and second language. They have found that negative and taboo words have a longer reaction time than positive and neutral words. The interference effect had the same magnitude in the first and the second language, which is in disagreement with theoretical assumptions about the organization of the bilingual lexicon and the “first language is more emotional” assumption.

## Research questions

In the present study the first aim was to construe a Hungarian and a Serbian emotional Stroop task. Our second aim was to use these experimental tasks in monolingual and bilingual groups. We wanted to see if there is differential processing of emotional content in the first and the second language of a bilingual at the level of a single neutral or negatively charged word pair.

In addition to this we wanted to compare monolingual first- and bilingual first-, and monolingual first- and bilingual second language processing of emotionally charged stimuli. We assumed that there will be a differential processing in the bilinguals first and second language.

## Method

At the first phase of the study we made a list of thirty three negative idiomatic two-word expressions and their thirty three, neutral pairs. These pairs were carefully selected and matched in terms of translation and meaning, because we had to have the most closely harmonized Hungarian and Serbian versions. Two Serbian and one Hungarian native speaker controlled the linguistic correctness of the pairs.

The next step was that thirty Hungarian monolingual university students evaluated sixty-six idiomatic expressions in terms of emotional valence: positivity, negativity or neutral emotional charge. The scale used for ratings was a 1-7 points scale, 1 meant the most negative grade and 7 meant the most positive grade.

Based on these ratings we chose eighteen negative expressions and their eighteen neutral pairs. On the positivity-negativity scale these eighteen pairs had the following mean ratings: negative pairs ranged from 1.27-2.53 with one pair mean at 3.73, with an average score 2.21. The mean ratings of neutral idiomatic expressions ranged from 4.03-5.83 with a pair at 3.27 and one at 3.63, with an average score 4.61.

These eighteen pairs were used to construe an emotional Stroop task on Hungarian and Serbian. The eighteen negative and neutral pairs were as follows (originally they were in Serbian and in Hungarian, but now we will list them in English): wheel chair – wooden chair, emergency exit – collateral exit, stolen money – paper money, evil thought – literary thought, painful moment – flitting moment, sad event – prospective event, pitiable life – everyday life, unconscionable person – adult person, toxic mushroom – mushroom from the woods, succubus behavior – common behavior, threatening message – SMS message, critical years – student years, lower

world – animal world, unresolved situation – today’s situation, shocking news – workplace news, death case – legal case, displeasing encounter – coincidental encounter, deluded woman – married woman.

We based our process of construction of the emotional Stroop task on Algom, Zakay and Monar’s (2009) methodology. This was the first attempt to compile an emotional Stroop task in Hungarian and Serbian languages based on two-word idiomatic expressions. The novelty of Algom et al.’s (2009) task is that they used the same words for target words in the neutral and negative expressions. These shared nouns allowed them to calculate the item-specific emotional Stroop effect, because they have the opportunity to find the difference in reaction time for the same target words by extracting the reaction time of the neutral version from the negative version. The slowdown can this way be attributed to the emotional force of the prime word.

In Algom and colleagues (2009) task it was the first, prime word - to which participants need not to give an answer – that gave a neutral or negative valence to the pair. One aim of ours’ was to find the equal counterparts – maximally matched translations - of expressions in Hungarian and Serbian. Algom and colleagues (2009) used expressions in which presenting both of the words rendered the expression emotional (for example a negative pair: WHEEL (first word in the expression) plus CHAIR (second word). In our version we did not apply this rule - in most cases the first presented words were already emotional or neutral in nature (for example a negative pair: DECEIVED plus WOMAN). The target words used were always nouns.

The participant’s task was to decide whether the color in which the second word is written is the same one that is written beneath it. They had to check whether the visual information of color is congruent with the meaning (or semantic information) of the word presented lower. We had congruent trials - when the color of the target word and the meaning of the word underneath it were matched; in incongruent trials in which they did not match. The trials were randomized. Bilinguals completed first the Hungarian version and after it the Serbian one.

## Participants

The participants were fifty young men and women, from Subotica and Novi Sad, Vojvodina, Serbia. We had a monolingual group from the Teacher Training Faculty in Subotica. Their mother tongue is Hungarian. There were 25 participants in this group. The age range was between 19-21 years, with four male and twenty-one female person.

The bilingual group consisted of high school students, who all go to the Bogdan Šuput design school in Novi Sad. This group consisted of 25 participants. The age range in this group was between 16-19 years, of which five was male and twenty was female.

There is an important difference between the two town, which is highly relevant for our study. In Subotica the environmental language is Hungarian and in Novi Sad, it is Serbian. So, although people from Subotica also learn Serbian in most cases, they do not use it at the everyday bases in contrast with people from Novi Sad. Participants from Novi Sad, although they come from Hungarian families, have a very early contact with a second language, Serbian. They become familiar with it at early childhood and they use it in formal environmental contexts.

Besides this, Hungarian-Serbian bilinguals from Novi Sad are mostly using Hungarian as a dominant language, but they are under a powerful impact of Serbian language. In many cases the language of formal education becomes mixed in time (e.g. they go to Hungarian secondary school and then to Serbian University or the opposite; or they go to a primary school in Hungarian and then to a Serbian secondary school).

As mentioned earlier, the experiment resembled to Algom and colleagues' design (2009:1557-1558). In accordance with this stimuli were presented on a color laptop monitor, using prototypical colors: red, blue, brown and green. The prime word was presented in black on white background. The position of words changed from trial to trial: in the case of primes 30 pixels and in the case of targets 50 pixels, to manage to avoid adaptation and fixating on the same part of the monitor. The words were always presented in Times New Roman, bold, font size 48.

The course of the experiment trial was the following: a fixation cross appeared at the centre of the monitor for 500 ms, then there was a blank interval for 200 ms, after which the prime word appeared below or above the centre for 200 ms. After a blank interval which was on for 200 ms, which was followed by the colored target word. This target word was present on the monitor until the participants gave their responses.

## Procedure

The experiment was done by all participants individually. They gave their responses by clicking on the right mouse button. The left click was for the matching pairs, when the color of the word and the meaning of the word underneath it was the same. The right click had to be used for the answers when the color of the target word and the meaning of the word below it did not match. The participants were instructed to give their responses as fast as they could, but taking care about the correctness of their responses.

The monolingual Hungarian participants did the Hungarian version of the experiment. The bilingual Hungarian-Serbian participants were first asked to complete the Hungarian version and after this they got the Serbian version of our emotional Stroop task.

## Methods of analysis

We used SPSS 17.00 to conduct the analyses. T-test for independent and dependent samples was applied. A Log 10 transformation was done, because we had to normalize the data in order to satisfy the normality assumption required by t-tests.

We did not take into the analyses the wrong answers and we did not correct the reaction time length for cases when they were longer than 2 seconds or shorter than 180 ms as Algom and colleagues (2009) did.

## Results

In our results we did not find a statistically significant Stroop interference. In the monolingual group there was no significant difference in the reaction time to negative and neutral counterparts. In the bilingual group, there was no significant difference in the processing of negative and neutral pairs, nor in reaction time length comparing the first, Hungarian and the second, Serbian language.

This means that in our results there are no significant differences in the processing of neutral and negative word pairs and we could not find a freezing reaction to threatening, fearful information.

Comparing the Hungarian monolingual group and the results of the Hungarian-Serbian bilingual group on the Hungarian task, we have found statistically significant differences. Additionally, comparing the Hungarian monolingual results and the bilingual Serbian results, there were significant differences. On the level of words, we will now present these group differences.

### Results of the Hungarian monolingual group and the bilingual groups' Hungarian task

a) Means of the Hungarian monolingual group (group sign 1) and of the bilingual Hungarian answers (group sign 3)

	GROUP	N	Mean
1 Wheel chair	1	22	2.9800
	3	24	3.0655
2 Stolen money	1	24	2.9072
	3	24	2.9989
3 Unconscionable person	1	20	2.9352
	3	24	3.0423
4 Toxic mushroom	1	25	2.9168
	3	25	2.9961
5 Unresolved situation	1	25	2.9138
	3	24	3.0197
6 Daily news	1	24	2.9391
	3	24	3.0625
7 Legal case	1	23	2.9658
	3	22	3.0613
8 Deluded woman	1	24	2.9358
	3	24	3.0311
9 Married woman	1	25	2.9254
	3	25	2.9876

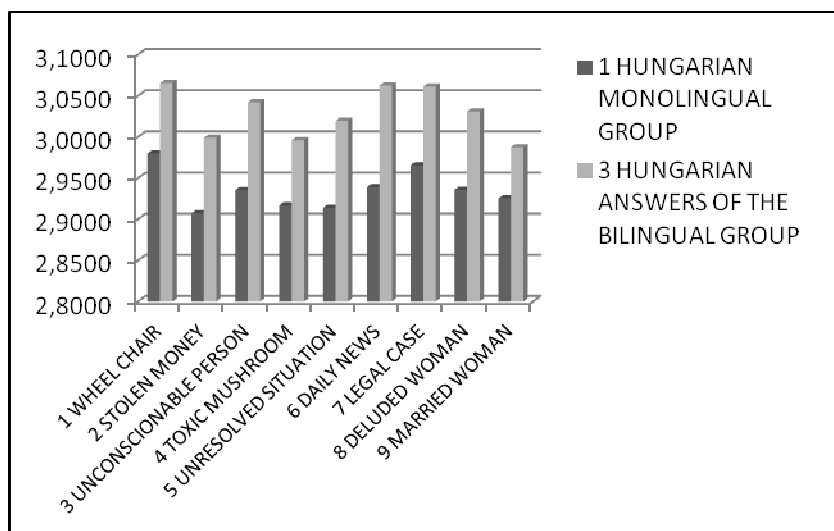
## b) Results – significant t-tests in the monolingual Hungarian and bilingual Hungarian task

		t	df	Sig. (2-tailed)
1 Wheel chair	Equal variances assumed	-2.097	44	.042
	Equal variances not assumed	-2.119	43.003	.040
2 Stolen money	Equal variances assumed	-2.554	46	.014
	Equal variances not assumed	-2.554	45.166	.014
3 Unconscionable person	Equal variances assumed	-2.801	42	.008
	Equal variances not assumed	-2.851	41.999	.007
4 Toxic mushroom	Equal variances assumed	-1.879	48	.066*
	Equal variances not assumed	-1.879	48.000	.066*
5 Unresolved situation	Equal variances assumed	-2.904	47	.006
	Equal variances not assumed	-2.897	45.937	.006
6 Daily news	Equal variances assumed	-2.460	46	.018
	Equal variances not assumed	-2.460	41.387	.018
7 Legal case	Equal variances assumed	-2.276	43	.028
	Equal variances not assumed	-2.265	40.192	.029
8 Deluded woman	Equal variances assumed	-2.559	46	.014
	Equal variances not assumed	-2.559	45.977	.014
9 Married woman	Equal variances assumed	-1.689	48	.098*
	Equal variances not assumed	-1.689	46.835	.098*

Results marked with \* are not significant on the level  $p < 0.05$ , but they show a tendency towards significance, they are smaller than  $p < 0.1$ .

These results mean that the monolingual group was always faster in the reaction times in quarter of the 36 words. Three of the words are from the neutral group and six from the negative list. These results mean that the bilingual group processed these words for a longer time than the monolingual group; their selective attention was cached/grabbed more intensively.

## c) Graph of the means of the significant results in the Hungarian tasks



## Results of the Hungarian monolingual group and the bilingual groups' Serbian task

d) Means of the Hungarian monolingual group (group sign 1) and of the bilingual Serbian answers (group sign 4).

	GROUP	N	MEA N
1 Emergency exit	1	24	2.9236
	4	25	3.0065
2 Stolen money	1	24	2.9072
	4	25	3.0395
3 Unconscionable person	1	20	2.9352
	4	25	3.0291
4 Toxic mushroom	1	25	2.9168
	4	24	3.0445
5 Mushroom from the woods	1	25	2.9315
	4	25	3.0198
6 Unresolved situation	1	25	2.9138
	4	25	2.9848
7 Legal situation	1	23	2.9658
	4	25	3.0369
8 Displeasing encounter	1	24	2.9510
	4	25	3.0571
9 Married woman	1	25	2.9254
	4	25	3.0406

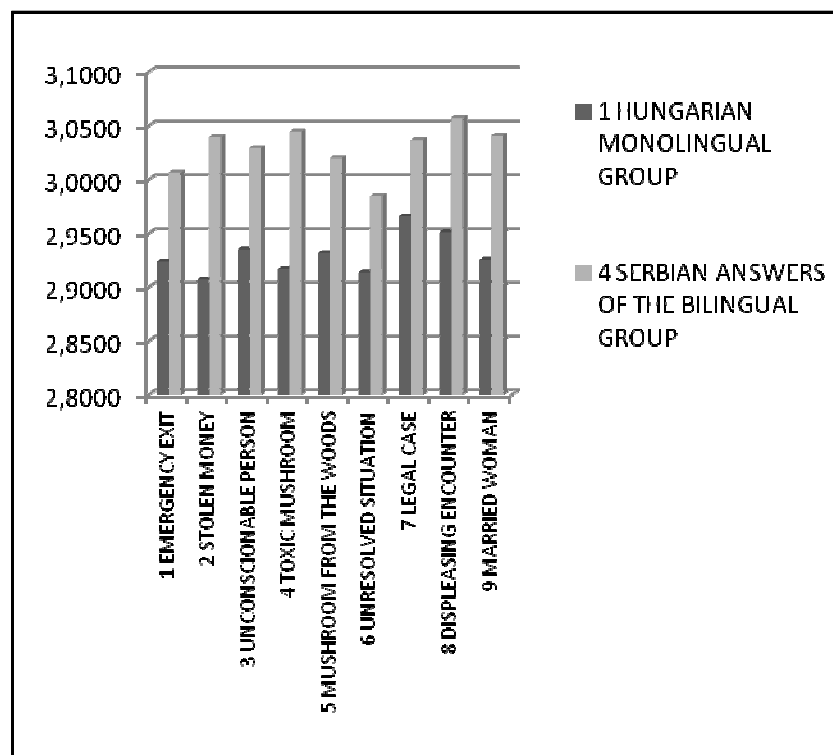
e) Results – significant t-tests in the monolingual Hungarian and the bilingual Serbian task.

		t	df	Sig. (2- tailed)
1 Emergency exit	Equal variances assumed	-2.563	47	.014
	Equal variances not assumed	-2.533	34.750	.016
2 Stolen money	Equal variances assumed	-3.289	47	.002
	Equal variances not assumed	-3.311	43.570	.002
3 Unconscionable person	Equal variances assumed	-2.329	43	.025
	Equal variances not assumed	-2.402	42.883	.021
4 Toxic mushroom	Equal variances assumed	-2.852	47	.006
	Equal variances not assumed	-2.847	46.097	.007
5 Mushroom from the woods	Equal variances assumed	-2.108	48	.040
	Equal variances not assumed	-2.108	46.912	.040
6 Unresolved situation	Equal variances assumed	-1.980	48	.053*
	Equal variances not assumed	-1.980	47.554	.053*
7 Legal case	Equal variances assumed	-1.807	46	.077*
	Equal variances not assumed	-1.819	45.754	.075*
8 Displeasing encounter	Equal variances assumed	-2.947	47	.005
	Equal variances not assumed	-2.952	46.893	.005
9 Married woman	Equal variances assumed	-2.730	48	.009
	Equal variances not assumed	-2.730	47.324	.009

Results marked with \* are not significant on the level  $p < 0.05$ , but they show a tendency towards significance, they are smaller than  $p < 0.1$ . In the comparison of the monolingual group and the bilingual Serbian results we also found nine differently processed words, three of them from the neutral and six from the negative list.



f) Graph of the means of the significant results the monolingual Hungarian and in the bilingual Serbian task



## Discussion

Our attempt to use two-word idiomatic expressions in Serbian and Hungarian language in the emotional Stroop task is a novelty and the first study of this kind in these two languages.

In our results we obtained no significant emotional Stroop interference in either of the groups. One possible explanation for this result is that maybe we should select more extreme and more negatively charged words - e.g. some connected to horrible, catastrophic events, death and very intensive, traumatic experiences.

A second intriguing view and result, concerning Serbian context and a similar problem is a research conducted by Ana Orlić (2010). This can be a very interesting point of reference to our results, too. She conducted an affective priming study, using positive, neutral and negative words. According to her results there are no significant differences in linguistic processing in the case of neutral targets in either of the three experimental situations: nor with neutral primes, nor with negative primes, nor with positive ones. The only significant difference was in the case when the negative targets were preceded by negative primes. The neutral and the positive prime in this case did not show a differential processing time. The reaction time was significantly faster just in the case of positive prime plus positive target and negative prime plus negative target.

In some way this result was replicated in the case of our study: there were no differences in processing the emotional and the neutral word pairs, concretely negative plus neutral words and neutral plus neutral words.

A second result from our study is that our bilingual participants did not show a difference in processing the negative and neutral idiomatic expressions in their first and their second language. The paired samples t-test in case of the Hungarian and Serbian version was not significant. This means that maybe there is a similar pattern of activation in their two languages and that their word representations in the first and the second language might be in correspondence regarding emotionality.

Comparing the monolingual and bilingual results we found that the bilingual group was slower in the case of first language and in their second language than the monolingual group. We might thus assume that the two languages of bilinguals again produced a similar automaticity level in processing the emotional and neutral words. In addition to this, we might assume that the slight group difference emerged because of a monolingual linguistic advantage because of functioning with just one language.

Looking at the monolingual-bilingual results, significant differences were found in six of the word pairs, which emerged repeatedly in both of the languages in bilinguals. These are: *stolen money*, *unconscionable person*, *toxic mushroom*, *unresolved situation*, *legal case* (neutral), *married woman* (neutral).

As we can see, the two significant repeated neutral pairs were *legal case* and *married woman*. We checked how these neutral cases were rated in the preliminary study in the 1-7 positivity-negativity scale: *legal case* with 3,266 and *married woman* with 5,466. So these expressions were rated on a satisfactory level as not negative, thus negativity in previous judgements cannot be an explanation for their appearance in significant results. Although it is possible for *legal case* and *married woman* to have specific connotations in young people: a *married woman* situation is still unfamiliar in nature for them and might be distant or *legal case* might be frequent in everyday use in mostly problematic situations.

The other group differences, which were not repeated in the two languages in the bilingual group were the following.

In the Hungarian version there were two negative pairs: *wheel chair* and *deluded woman*, and one neutral pair: *workplace news* (in the preliminary study rated 4,033 in the 1-7 positivity-negativity scale).

In the Serbian version again three new expressions were again two negative: *emergency exit* and *displeasing encounter* and one neutral: *mushroom from the woods* (the preliminary study rated 4,00 in the 1-7 positivity-negativity scale).

We will again discuss the neutral differences: *mushroom from the woods* might count for a strange thing and in this naturalistic sense for an unfamiliar vegetable. *Workplace news* also might have negative overtone based on possible more negative past experiences regarding these news in these participants.

In conclusion, we should highlight that according to previous research (see Eilola, Havelka & Sharma, 2007) results of language emotionality studies depend highly on several factors: age of acquisition of the second language (prior to age of seven counts for early bilingualism), level of proficiency in this language and the emotional contexts of learning theory. The emotional context of learning means that learning a language in early childhood makes it more emotional, because this is the period of the development of emotion regulating systems.

We might assume that our participants are proficient enough in both of their languages and that they have encountered both of the languages early enough in childhood to acquire their adequate emotionality and this is might be the key reason that we did not find differences in the first and second language in bilinguals. Furthermore, this means that our bilingual participants have the same processing mechanism in their mother tongue and their second language regarding neutral and negatively laden emotion words.

Regarding group differences, our significant results from comparing the monolingual and bilingual group accounts for a quarter of the word pairs used. It is interesting that in the bilingual group in most cases the same words were slower processed in both of the languages which can be explained in terms of similar emotion-linguistic experiences and knowledge in the two languages.

The fact that we did not find bilingual first- and second language processing time differences also means that there is no practice effect which transfers from the first, earlier completed Hungarian version, to the second, Serbian version.

Our future plan is to compose a new emotional Stroop tasks in Hungarian and in Serbian with positive, negative and neutral words. Another additional change could be the use of more extreme emotional words. A third possibility is to use negative prime plus negative target and neutral prime plus neutral target word pairs.

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