Syntax and Semantic Analysis in Mathematical Problem Posing Viewed From Field Dependent and Field Independent Cognitive Styles

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Keywords	ABSTRACT
Pengajuan Masalah, Sintaksis, Semantik, Gaya Kognitif, Field Dependent dan Field Independent.	Penelitian ini merupakan penelitian deskriptif dengan pendekatan kualitatif, bertujuan mendeskripsi kemampuan mahasiswa semester IV dalam pengajuan masalah dari aspek sintaksis dan semantik. Terdapat dua subjek yang diteliti, yaitu masing-masing mahasiswa bergaya kognitif *field dependent* dan *field independent*. Subjek penelitian ditentukan menggunakan skor instrument GEFT dengan mempertimbangkan kesamaan jenis kelamin, kemampuan matematika, kecakapan dalam berkomunikasi, kesediaan menjadi subjek penelitian. Aspek yang dianalisis pada masalah yang diajukan dari aspek gaya bahasa yaitu sintaksis dan semantik. Analisis sintaksis dilihat dari bentuk masalah yang diajukan berupa penugasan, hubungan dan pengandaian. Sementara aspek semantik dianalisis berdasarkan termuatnya unsur menyatakan kembali, mengubah, membandingkan, mengelompokkan dan menvariasikan. Masing-masing subjek penelitian diberikan informasi berbentuk kalimat verbal dan grafik, yang selanjutnya sebagai acuan dalam pengajuan masalah. Dari analisis data, diperoleh subjek *field independent* lebih baik dalam mengajukan masalah dibandingkan subjek *field dependent*. Subjek *field independent* mampu mengajukan masalah yang memuat semua unsur sintaksis dan semantik, sementara subjek *field dependent* tidak mampu mengajukan masalah yang memuat unsur sintaksis dan semantik.
Problem Posing, Syntax, Semantics, Cognitive Style, Field Dependent and Field Independent.	*This research is a descriptive study with a qualitative approach, aiming to describe the abilities of fourth semester students in problem solving from syntactic and semantic aspects. There are two subjects studied, namely each student with field-dependent and field-independent cognitive styles. Research subjects were determined using GEFT instrument scores taking into account gender equality, mathematical abilities, communication skills, and willingness to become research subjects. The aspects analyzed in the problem posed are from the aspect of language style, namely syntax and semantics. Syntactic analysis is seen from the form of the problem posed in the form of assignments, relationships and*

suppositions. While the semantic aspect is analyzed based on the elements of restating, changing, comparing, classifying and varying. Each research subject was given information in the form of verbal sentences and graphics, which were then served as a reference in problem posing. From the data analysis, it was obtained that field-independent subjects were better at posing problems than field-dependent subjects. Field-independent subjects are able to pose problems that contain all syntactic and semantic elements, while field-dependent subjects are unable to pose problems that contain syntactic and semantic elements.

INTRODUCTION

Ability everyone does always same, because there is difference in process knowledge, begins from stages accept information, processing and expression knowledge. Motahari & Norouzi (2015) say characteristic typical or way more preferred for think, feel and remember, to realized fully for example in solving problem That called as style cognitive. Capable students fulfil indicator understanding mathematical This because student can understand draft something material though given problem different ever presented by educators or in the book reference (Annisa, 2023). A number of style familiar cognitions among them style cognitive classified reflective-impulsivity based on speed and determination in respond, *visualize-verbalizer* classified seen from method learn and how communicate something thought out, systematic-intuitive classified based on method evaluate information and choose a strategy in finish problem and *field dependent (FI)-filed Independent (FD)* classified based on big influence environment to activity cognitive.

FI and FD cognitive styles have substantial difference. Cognitive style has characteristics tend looked object consists from parts separated from environment as well as capable analyze in separate the elements from the context in a manner more analytics. Temporary style cognitive FD has inclined characteristics organize and process information globally so his perception easy affected by change

environment. Marisa (2021) explain characteristic a person who is cognitively inclined to FD No can respond condition environment, meanwhile characteristic a FI inclined based on conditions the. Besides that, the subject of FD tends to be depended on information that has obtained without hook concept that has obtained when solve something problem, meanwhile subject FI uses concepts needed and not rely on the information already provided obtained just when finish problem. Far previously, Almolhodaei (2002) compare between stylish subject cognitive FI and FD as following.

1. FI and FD individuals are different in applied cognitive processes as well as in effectiveness performance them.

2. Significant FI score taller than FD in every field knowledge knowledge and mathematics.

3. FI individuals tend to more independent of inclined FD more depending on the environment external.

4. More FI individuals capable show Skills arrangement cognitive than FD individuals.

5. FI individuals show more results tall from FD subject in cope complexity problem story.

Difference FI and FD characteristics can be caused ability somebody in submission problem. Arikan & Unal (2021) considers submission problem be one of the inside capital solve problem. Included in it develop Skills think creative. Due to filing problem considered as trigger creativity. The same thing was also confirmed Physical & Kar (2012) say submission problem is combined between ability subject in solving problem, ability communication and creativity.

Experts looked submission problem own close definition same. The National Council of Teachers of Mathematics (NCTM) defines submission problem as formulation problem new based on situation or experience certain (in Kar et al., 2010). Ticha & Hošpesová (2010), and Kar & Işık (2014), Mishra & Iyer (2013) see submission problem own same definition that is generalize problem new and formulate existing problem or given situation. Prihandini, et al (2020) see submission problem can used to show ability think he has so that can put forward new ideas in accordance with his thoughts. it emphasized Aba & Nusantara (2020) that submission problem mathematical can used to know identified items in think creative. Because of that learning mathematics need designed structured and the best maybe for students used to express their ideas (Annisa et al, 2020).

Stoyanova & Ellerton in (Amirulmukminin, 2017) share activity submission problem in three type that is, submission problem free (*free problem posing*), filing semi *structured* problem posing, and submission problem structured (*structured problem posing*). *Free Problem Posing* according to Bonotto and Santo (2015) said that submission problem situation free form submit problem without given boundary, subject only requested for submit problem mathematics from situation certain. *Semi-structured problem posing* form gift information open and ask for explore information it and finish it with use knowledge, skills, concepts and interrelationships with experience before. Temporary *structured problem posing* as submission problem based on a problem certain. In framework disclose structure ability math. Bonotto and Santo (2015) said submission problem structured refers to the situation, ie problem filed with formulate problem already resolved.

The problem posed by the subject study later will analyze and reviewed from facet structure language. Referring to Silver and Cai (in Rahman & Ahmar, 2017), abilities submission problem can seen through structure the language used and can nope problem resolved. But as of this writing, only focus analysis on structure Language that is

aspect syntax and semantics. This based on No A little student major waiting math will become a math teacher compile question with confusing sentence student even not a little can not resolved.

Rahman & Ahmar (2017) explain syntax can shared become three element that is problem posed show messenger in the form of (1) assignment, interpreted as question (problem) that shows task For done, (2) relationship interpreted as question (problem) that shows task form comparing, and (3) supposition interpreted as question (problem) using information addition. Temporary semantics in view Sari, Siswono, and Lukito (2020) shared into five elements that is problem posed contain element (1) states return, i.e. the data that is inside problem Still using data on information, (2) changing, ie problem posed using different data with information, (3) compare, ie problem posed contain element comparison For know equality or difference. (4) grouping, ie problem posed use some data inside one problem, whether the data is inside information nor using new data, and (5) varying, ie problem posed merge existing data there and new data.

Ability in submission problem the No regardless from method How management something information

become something knowledge. Process of receiving, formulation, and delivering knowledge, incl ability in submission problem called with style cognitive. Witkin (1973) states that style cognitive as a model or working characteristics for disclose whole activity perception and activity intellectual with a very consistent and very pervasive way. More continued Witkin (1973) said style cognitive is method every individual in act, and adapt to environment.

As explained at the beginning, that each student own style different cognition. Not amazed If there is understanding student with fast given material and so otherwise. For that, the approach used by the teacher or teacher in teaching too capable customize with style cognitive student the. So that hope student succeed in learning will achieve in a manner maximum.

Study This done for see How ability stylish student cognitive FI and deep FD understand and get submit problem new from the information provided. As for the information provided that is form information in form verbal sentence containing question stories and information in form a chart containing sales data motorcycle.

METHODS

The subject in study This chosen through giving *the Group Embedded Figures Test* (GEFT) instrument to sixth semester student of Mathematics Education IKIP Mataram. Besides classification style cognitive, similarity type gender, ability communication and abilities Mathematics is also considered. GEFT instrument adapted from Witkin (in Amirulmukminin, 2017) . After be measured use the GEFT instrument and pay attention criteria as has been set, then taken by one student each stylish cognitive *field independent* (SFI) and *field dependent* (SFD).

Ability submission problem obtained through the Submission Test instrument Problem (TPM) loading information in form verbal sentences and graphics, and interviews. TPM contains information about material mathematics presented economy in form graphics and verbal sentences. Guidelines interview form in some questions asked for see ability in submit problem. For test data validity using approach triangulation time. Where is the awarding of TPM I and Interview I for see ability submission given problem after set subject stylish research cognitive FD and FI, while TPM II and interview II were used for see consistency ability submission given

problem intermittent a week after TPM I and interview I were conducted. From the results submission problems and interviews that, next problem posed analyzed in a manner descriptive and reinforced through interview with notice indicator syntax and semantics that have been set.

RESULTS AND DISCUSSION

Information provided _ to SFI and SFD in the form of information graphics and verbal sentences. As for information in form chart shown in Figure 1. Meanwhile verbal sentence in the form of something telling statement activity sell buy shown in Figure 2.
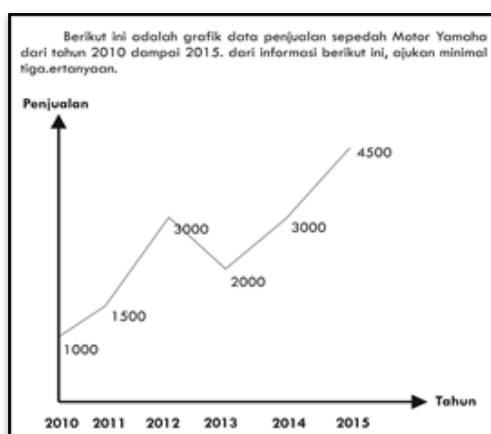
Berikut ini adalah grafik data penjualan sepeda Motor Yamaha dari tahun 2010 dampai 2015. dari informasi berikut ini, ajukan minimal tiga.ertanyaan.

Figure 1. Information in Form Chart

Budi membeli 3 keranjang rambutan, 3 keranjang apel dan 4 keranjang jeruk pada seorang petani. Buah-buahan tersebut akan dijual di salah satu pasar dekat rumahnya. Budi membeli 3 keranjang Rambutan dengan berat 30 kilogram setiap keranjangnya dengan harga Rp. 450.000,00. Satu keranjang Apel sebesar 25 kilogram sama dengan harga 1,5 keranjang rambutan dan 1 keranjang jeruk dengan dengan berat 30 kilogram sama dengan harga 1 keranjang apel. Biaya transportasi yang dikeluarkan Budi untuk membeli buah-buahan tersebut adalah Rp. 285.000,00.

Figure 2. Information in Form Verbal Sentences

After done research, then obtained results research as following.

Subject Field Independents (SFI)

Following will Ability submission problem distinguished based on the

information provided, ie information in form graphics and verbal sentences.

Information Chart

From information in the given graph, SFI poses five problems. The problems raised by SFI are shown in Figure 3. Analysis ability submission SFI problems are shown in Table 1.
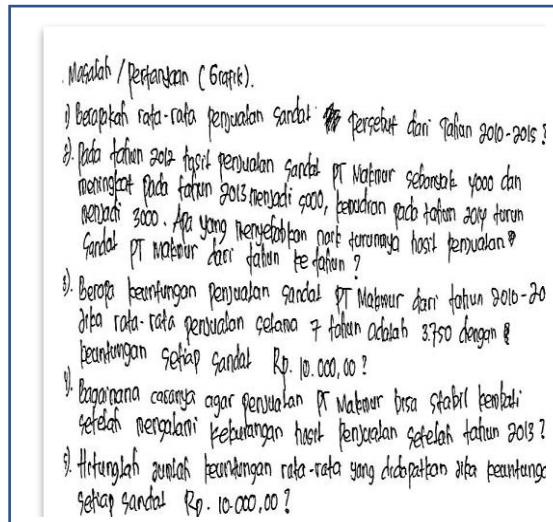

Figure 3. Problems raised by SFI from Information Chart

Table 1.
Ability Recapitulation Submission SFI problem from Information Chart

Language Structure Used		Question					Total
		1	2	3	4	5	
Syntax	Assignment	√	√	-	√	-	3
	Connection	-	-	-	-	-	0
	supposition	-	-	√	-	√	2
Semantics	Restate _	√	√	-	√	-	3
	Change	-	-	√	-	√	2
	Compare	-	-	-	-	-	0
	Grouping	√	-	√	-	√	3
	Vary	-	-	√	-	√	2

SFI poses 3 issues. The problem posed by SFI is loading element assignment and 2 problems contain element supposition. However, through results interview, SFI pointed out ability submit loading problem element relationship.

Q6   : How is the relationship?
SFI106 : Nope There is maybe
P7   : Yes bro make approx?
SFI107 : Hmmmmm ......
          Possible like difference sales in 2011 with 2013 huh?

P8   : It can be made he asked in a manner complete.
Write sheet interview just

SFI108 : "How much difference sales in 2011 and 2013?"

P9   : Can be given explanation Where There is element relationship?

SFI109 : Right asked difference, so Certain connection maybe

From the results submission problem written and elaborated through interview with SFI. SFI capable submit fulfilling problem aspect syntax on aspects connection as results interview on points *SFI108*, as for problem posed is loaded question relationship. Temporary aspect semantics, only load element state return, transform, group and vary. But SFI is capable submit fulfilling problem element compare moment interview.

Q17   : How with question bro for earlier?

SFI117 : Which one?

P18   : This one Lol
The editorial
" How much difference sales in 2011 and 2013?"

SFI118 : Ohh He yes ... I forgot. Maybe it compare, because We compare sale in 2011 and 2012

Initially on the problem raised SFI did not load element compare, however after confirmed through interview, SFI able submit containing problem fifth semantic elements, incl element compare that look on the points the *SFI118*. So that from results study the is known capable submit fulfilling problem whole indicator syntax and semantics.

Information Verbal Sentences

On information verbal sentences, SFI poses 5 problems. The problem posed by SFI is as seen in Figure 4.
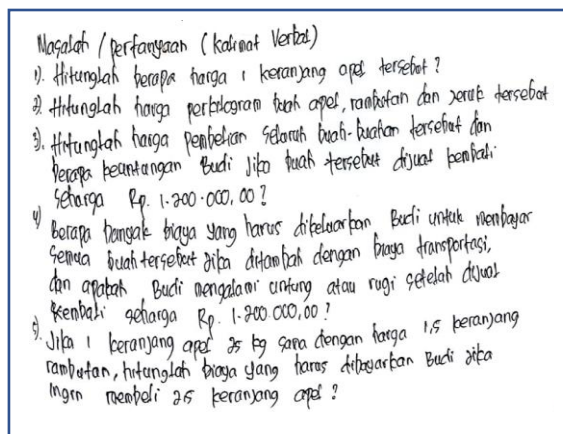

Figure 4. Problems raised by SFI from Information Verbal Sentences

Analysis from the problems raised by SFI are presented in Table 2 below.

Problems SFI raises on information verbal sentence contains whole element syntax.

Likewise with element syntax is also

included.

Table 2.
Recapitulation Ability Submission Problem subject *Field Independent* (SFI) from Information Verbal Sentences

Language Structure Used		Question					Total
		1	2	3	4	5	
Syntax	Assignment	√	√	-	-	-	2
	Connection	-	-	-	-	√	1
	supposition	-	-	√	√	-	2
	Restate _	√	-	-	-	-	1
Semantics	Change	-	√	√	√	√	4
	Compare	-	-	-	-	√	1
	Grouping	-	-	√	√	-	2
	Vary	-	-	√	√	√	3

Subject Field Dependents (SFD)

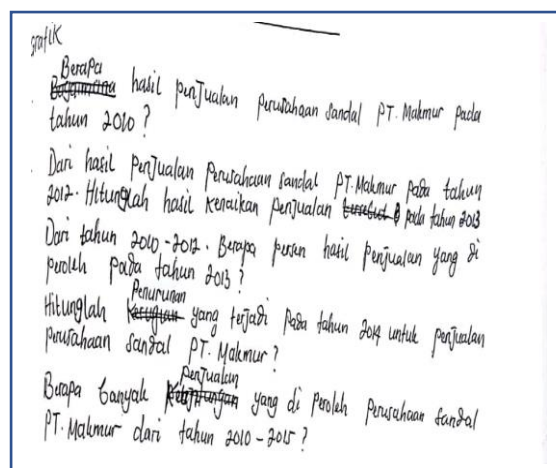Ability submission SFD problem is analyzed based on the information provided.

Figure 5. Problems raised by SFD from Information Chart

Table 3.
Recapitulation Ability Submission Problem subject *Field Dependent* (SFD) from Information Chart

Language Structure Used		Question					Total
		1	2	3	4	5	
Syntax	Assignment	√	-	-	√	√	3
	Connection	-	√	√	-	-	3

	supposition	-	-	-	-	-	0
	Restate _	√	√	√	√	√	1
	Change	-	-	-	-	-	0
Semantics	Compare	-	-	-	-	-	0
	Grouping	-	√	√	-	√	3
	Vary	-	-	-	-	-	0

Information Chart

SFD poses 5 problems from information shape graph, namely Figure 5. A analysis ability submission SFD problems are shown in Table 3.

From Table 3, it can be seen SFD only capable submit problem containing two elements syntax that is assignments and relationships. Temporary shape problem supposition, SFD confessed difficulty for submit it.

P8 : If so, can you make demonstrating question element supposition?
SFD108 : Where am I write?
P9 : Behind just …
SFD109 : (Subject open sheet provided researcher)
P10 : Please written on the sheet behind just.
SFD110 : I tried first.

Information Verbal Sentences

As in information in form chart, SFD on information Verbal sentences also pose 5 problems. As for the problem posed as in Figure 6. Following it will be displayed results analysis the problems raised by SFD in Table 4.

(Thinks briefly)
I'm confused ….
P11 : Brother Can or no
SFD111 : No can … hmmmmm …
the question I confused.

Temporary from side semantics, only there are two elements just that is state go back and group just. SFD confessed difficulty for submit loading problem element change, compare and vary.

P18 : Yes bro submit containing problem element change, compare and vary?
SFD118 : Just a moment first …
(Reading questions and questions asked).
P19 : For examples course, brother Can using new data that is not There is in above information.
SFD119 : Hmmmm ….
Nothing yet in thought I

SFD only capable submit problem form assignment and supposition. While stating no connection there. Temporary facet semantics, SFD file containing problem stated element return, modify and group. No only aspect syntax and semantics course, editor sentences that SFI uses better compared to SFD. SFD spelled

out weak in compile sentence, choice of words that are not appropriate for used for the problem posed. New SFD know happen error in choice of words after corrected moment interview.
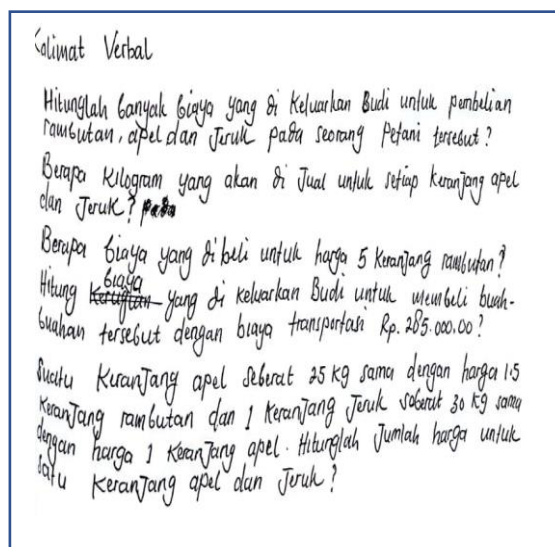

Figure 6. The problem SFD raised from Information Verbal Sentences

Table 4
Recapitulation Ability Submission Problem subject *Field Dependent* (SFD) from Information Verbal Sentences

Language Structure Used		Question					Total
		1	2	3	4	5	
Syntax	Assignment	√	√		√	√	4
	Connection	-	-	-	-	-	0
	supposition	-	-	√	-	-	1
Semantics	Restate _	√	√	-	√	√	4
	Change	-	-	√	-	-	1
	Compare	-	-	-	-	-	0
	Grouping	√	-	-	-	-	1
	Vary	-	-	-	-	-	0

Research results above, aligned with research conducted Marisa, Nuriyati, and Ayuningtyas (2021) Where explained that FD students on stages understand question, Subject FD is able explain questions that have given still before explain especially formerly discuss with teacher. Whereas FI students explained question without must ask first to the teacher. This showing that FD students still Not yet capable do in a manner independent and inclined need guidance. Likewise in the research conducted Milda et al., (2022) show that FI subjects tend to

more Good compared to with FDs. That hl proven that FD subject in submit problem only fulfil category reformulation problem and reconstruction problem, temporarily subject capable submit problem fulfil category reformulation, reconstruction, and imitation problem. Even Far previously, Rama (2013) disclose students who have style cognitive FI able submit problem math can resolved and load new data, with category problem mathematics quality high, meanwhile students who have style cognitive FD able submit problem math can resolved However No load new data, with category problem mathematics quality medium.

CONCLUSION

There is difference conspicuous between ability submission problem student stylish cognitive FI and FD from facet structure language. SFI capable submit loading problem all element syntax that is showing messenger form assignments, relationships and suppositions. Likewise with structure semantics, fifth element semantics that have set there is in the problem posed by SFI is good on information shaped chart nor verbal sentences. While SFD on information shaped chart only capable submit problem showing two elements syntax that is assignment and relationship, none different with element semantics, only load statement form state goes back and group. Temporary problems posed by SFD on information verbal sentence, also contains two elements syntax that is assignment and supposition, temporary aspect semantics only there is three that is state go back and change and group. The same thing also happened to the choice of words used in compile sentence. deep SFI use the word more correct, while SFD sometimes use the word no right and new realize after There is help moment activity interview. With thus, results study This showing that FI subject better in submission problem reviewed from style cognitive compared to with FD subject.

Research results This become important for lecturer or teacher to pay attention and know style cognitive student, so approach used in teach in accordance with style catch student. Because none student own ability and style the same cognitive, consequently need capable learning accommodate cognitive student. So that other researchers can do study more continuation Specific especially study development that is presenting seller in the form of lesson plans, textbooks, worksheets that are ideal for stylish student FI cognitive and stylish students cognitive FD.

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