İnönü Üniversitesi Uluslararası Sosyal Bilimler Dergisi
Cilt 4, Sayı 2, 2015, s. 179-187.
www.inijoss.net

GENSLER'S STAR TEST AND SOME EXAMPLES OF ITS APPLICATION

Mustafa YILDIRIM
İnönü Üniversitesi, Fen-Edebiyat Fakültesi
Felsefe Bölümü
mustafa.yildirim@inonu.edu.tr

ABSTRACT

"Star test" is a method of checking the validity of syllogistic arguments devised and first introduced by Gensler in 1973. In his paper "A Simplified Decision Procedure for Categorical Syllogism", Gensler contrasts "star test" with the set of rules traditionally used in checking the validity of syllogistic arguments. Gensler attempts to show that his method is more advantageous and functional insofar as syllogistic and deductive arguments are concerned. The aim of this paper is twofold: to introduce and evaluate Gensler's "star test". Its will be shown that while Gensler's "star test" seems advantageous in some contexts, it is not a proper method for checking the validity of certain types of categorical syllogisms.

Key Words: Star Test, Syllogism, Syllogistic Logic, Validity.

GENSLER'İN YILDIZ TESTİ VE ONUN BAZI ÖRNEKLERE UYGULANMASI

ÖZET

"Yıldız Testi", kıyasların geçerliliğinin denetlenmesi için, ilk kez Gensler tarafından 1973'te icat edilmiş ve tanıtılmış bir yöntemdir. Gensler "A Simplified Decision Procedure for Categorical Syllogism" başlıklı makalesinde, "Yıldız Testi"ni, kıyasların geçerliliklerinin denetlenmesinde geneneksel olarak kulanılmış olan kurallar kümesiyle karşılaştırmıştır. Gensler, kıyaslar ve tümdengelimsel argümanlar söz konusu olduğu ölçüde, kendi yönteminin daha avantajlı ve işlevsel olduğunu göstermeye çalışmıştır. Bu makalenin iki temel amacı vardır: Gensler'in "Yıldız Testi"ni tanıtmak ve değerlendirmek. Bu doğrultuda, Gensler'in "Yıldız Testi"nin bazı açılardan avantajlı görünse de, bazı kategorik kıyas türlerinin geçerliliğini denetlemek için uygun bir yöntem olmadığı gösterilecektir.

Anahtar Sözcükler: Yıldız Testi, Kıyas, Kıyas Mantığı, Geçerlilik.

INTRODUCTION

In the general sense of the term, a (categorical) syllogism is a deductive argument consisting of two premises and one conclusion. And “syllogistic logic studies arguments whose validity depends on “all”, “no”, “some” and similar notions.”[1] This branch of logic had firstly been developed by Aristotle. “As far as we know, he was the first to formulate a correct principle of inference, to use letters for terms, and to construct an axiomatic system.”[2] Aristotle “created syllogistic logic, which studies arguments like the following (which use statements of the form ‘all A is B,’ ‘no A is B,’ ‘some A is B,’ or ‘some A is not B’)”:[3]

All mammals are hematothermal.	all M is H
All whales are mammals.	all W is M
∴ All whales are hematothermal.	∴ all W is H

STAR TEST

Star test is a method of checking the validity of syllogistic arguments and is devised and first introduced by Harry J. Gensler[4] in 1973. Gensler created a special “syllogistic language,” with “well-defined rules for formulating arguments and checking validity.”[5] In his paper “A simplified decision procedure for categorical syllogism”[6], Gensler compares “star test” with more traditional set of rules which are used in checking the validity of syllogistic arguments. Gensler attempts to show that his method is more advantageous and functional insofar as syllogistic and deductive arguments are concerned.

In his “syllogistic language”, uppercases are used for general terms or a class of individuals (terms that describe or put in a category, like “philosopher”, “a pretty baby”, “attractive” or “plays a piano”, etc.) while lowercases are used for specific individuals or singular terms (terms that pick out a specific person or thing, like “Einstein”, “the world’s most beautiful village”, “this village”, etc.). For example,

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1 Harry J. Gensler, *Introduction to Logic,* 2nd ed., New York and London: Routledge, 2010, p. 7.
2 *Ibid.,* p. 351.
3 *Ibid.,* p. 351.
4 He is a professor of philosophy at Loyola University.
5 *Ibid.,* p. 7.
6 Harry J. Gensler, “A simplified decision procedure for categorical syllogism”, *Notre Dame Journal of Formal Logic*, Volume XIV, Number 4, October 1973, pp. 457-466.

All philosophers are intelligent.		all P is I
Badiou is a philosopher.	→	b is P
∴ Badiou is ingelligent.		b is I

This man is the world's most ingelligent person	= m is p
This man is an intelligent person	= m is P
Oprah Winfrey hosts a TV programme	= o is P

(Oprah Winfrey is a person who hosts a TV programme)

His syllogistic calculus or language includes five words: "all", "no", "some", "is" and "not". "Grammatical sentences" of this language "are called wffs or well-formed formulas."[7] His calculus includes the following eight wffs or well-formed formulas (these wffs can be written with upper and lower cases):[8]

All A is B	Some A is B	x is A	x is y
No A is B	Some A is not B	x is not A	x is not y

As already mentioned, upper cases are used for general terms or classes of individuals and lower cases are used for specific individuals and singular terms. Practically, this means that:

a. In Wffs beginning with a *word* (not a letter), there are two upper cases:

(Wffs)	Non-Wffs
Some C is D	Some c is d
All A is B	All a is b

b. Wffs beginning with a *letter* (not a word) begin with a lower case:

(Wffs)	Non-Wffs
g is D	G is D

We can also add that if a wff begins with a lower case, then the second letter can be upper or lower case; thus both "g is D" and "g is d" are Wffs.

[7] Gensler, *Introduction to Logic,* p. 7.
[8] *Ibid.*, p. 7.

We can use any letter of our choice for a term. For example, we can use “B” or “C” or any other upper case letter for “a brilliant child”, and similarly, we can use “b” or “c” or any other lower case letter for “this brilliant child”. But we have to use the same letter for the same term consistently. If we choose to use “B” for “a brilliant child”, for example, we should always use “B” for this term.

“All syllogistic Wffs have the verb ‘is’”,[9] and for a sentence to be translated to a Wff, it also has to have the verb ‘is’. So, if a sentence doesn’t have the verb “is”, we should first rephrase it. For example, “All philosophers think” should be rephrased as “All philosophers is [are] *thinkers*” and “Mehmet speaks Danish” should be rephrased as “Mehmet is a person who speaks Danish”. Thus, “All philosophers is [are] *thinkers*” can be translated to the Wff “All P is T” and “Mehmet is a person who speaks Danish” can be translated to the wff “m is S”.

DISTRIBUTION OF TERMS

To see how the star test is applied to syllogistic arguments, first of all, we need to speak of the logical term “distributed”. The distribution of terms depends on two main points: “(1) the classes designated by the subject and predicate terms (pencils, sadness); and (2) the extent to which these classes are occupied or distributed (all or only part).”[10]

In all four types of categorical propositions, “reference is made to various classes designated by the two primary terms, the subject and the predicate.”[11] “What we need to know is whether the reference is to the whole of the class or only to part of the class. If the reference is to the whole of the class, then the class is said to be distributed. In other words, a term is distributed when it refers to all the members of the class (i.e. when the class is fully occupied). Distribution can be designated by a stated or implied all. If the reference is only to part of the class, then the class is said to be undistributed. In other words, a term is undistributed when it refers to less than all the members of its class (i.e. when the class is not fully occupied).”[12]

DISTRIBUTION OF TERMS IN THE EIGHT TYPES OF WELL-FORMED FORMULAS (WFFS)

a. *Universal Affirmative Propositions (All As are Bs)*

The universal affirmative proposition asserts that “every member of the subject class is a member of (but not the whole of) the predicate class.”[13] “Since reference is made to every member of the subject class (All S…), the subject is said to be distributed.”[14] But every member of the subject

[9] *Ibid.*, p. 8.
[10] David Naugle, “Distribution of Terms: Parts of a Syllogism”. Available at: http://www3.dbu.edu/naugle/pdf/2302_handouts/parts_of_syllogism.pdf (Accessed: 2 March 2015).
[11] *Ibid.*
[12] *Ibid.*
[13] *Ibid.*
[14] *Ibid.*

class doesn't make up the whole members of predicate class. For example; if you say that "All philosophers are sceptics", you are saying that every member of the class "philosophers" is a member of sceptics. But you are not saying that only philosophers are skeptic, nor that philosophers make up the whole members of sceptics. So, the predicate term of a universal affirmative proposition is undistributed.

b. *Universal Negative Propositions (No A is B)*

The quantifier of a universal negative proposition (No A…) "makes reference in a negative way to every member of the subject class. Thus it is universal."[15] This type of proposition "states that not a single member of the subject class is a member of the predicate class,"[16] and vice versa. Thus the reference is to whole members of both the predicate and subject classes. For example, if you say that "No dogs are cats", you are saying that not a single member of the class "dogs" is a member of the class "cats", and vice versa. Then, both terms are distributed and consequently such a proposition can be converted simply: "No cats are dogs."

c. *Particular Affirmative Propositions (Some A is B)*

The quantifier 'some' "makes it clear that only some members of the subject class are being referred to, so the subject" of particular affirmative proposition "is undistributed (Some S …)."[17] Therefore, "the proposition as a whole is particular."[18] And predicate class of this proposition is similarly undistributed. For, "reference is being made to only some of the members of that class not the whole of it."[19] For example, if you say that 'Some women are wealthy', you refer only to some members of the class 'women', and you also refer only to some members of the class 'wealthy' (you do not refer to wealthy men, for example). So, in this type of propositions, "both the subject class and the predicate class are undistributed, and consequently such a proposition can be converted simply:"[20] 'Some of the wealthy are women.'

d. *Particular Negative Propositions (Some A is not B)*

"The quantifier 'some'" in this type of propositions "indicates that reference is being made to only some of the subject class (Some S …). The subject term is therefore undistributed and the proposition as a whole is particular."[21] But the predicate term is distributed, because to say that 'Some S is not P'; you have to know the sum total of the predicate class. For example, if you say 'Some physicians are not logicians'; you have to know the sum total of logicians to assert that some physicians do not belong to the class of logicians. Hence, in this type of propositions, the subject is always undistributed and the predicate is always distributed and for this reason, this type of propositions cannot be converted.

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[15] *Ibid.*
[16] *Ibid.*
[17] *Ibid.*
[18] *Ibid.*
[19] *Ibid.*
[20] *Ibid.*
[21] *Ibid.*

e. *Singular Propositions which can be translated into “x is A” and “x is y”*

This type of propositions can be thought as particular affirmative propositions. So in this type of propositions, both the subject term and the predicate term are undistributed.

f. *Singular Propositions which can be translated into “x is not A” and “x is not y”*

These propositions can be thought as particular negative propositions. So in this type of propositions, the predicate term is distributed and the subject term is undistributed.

Here are Gensler’s wffs again, but this time the distributed terms are undermined:[22]

All $\underline{A}$ is B	some A is B	x is A	x is y
No $\underline{A}$ is $\underline{B}$	some A is not $\underline{B}$	x is not $\underline{A}$	x is not $\underline{y}$

If we pay attention to which letters are distributed we can see that:

- “The first letter after “all” is distributed, but not the second.
- Both letters after “no” are distributed.
- The letter after “not” is distributed.”[23]

Now we are ready to introduce the star test for validity:

> If you star (put an asterisk on) the premise letters that are distributed and conclusion letters that are not, then the syllogism is valid if and only if every uppercase letter is starred only once and there is only one star on the right hand side (i.e., after after “is” or “is not”).[24]

The star test can be applied by using a three-part procedure: 1) underline the distributed letters, 2) star the distributed (underlined) letters in premises and undistributed (not underlined) letters in conclusion, 3) see how many times every letter is starred and how many starred letters there are on the right hand side. If every uppercase letter is starred only once and there is only one starred letter on the right hand side, then the syllogistic argument is valid.

[22] Gensler, *Introduction to Logic*, p. 10.
[23] *Ibid.*, p. 10.
[24] Gensler, “A simplified decision procedure for categorical syllogism”, p. 460.

Example 1:

All <u>A</u>* is B	Since A comes after "all" it is a distributed term. So we should undermine it. And since it is a distributed term of a premise, we should also star it.
Some C is A	A premise which has no distributed terms. No letter should be undermined or starred.
∴Some C* is B*	These letters are undistributed terms. So we don't undermine these letters, but we asterisk both of them. Because the letters that should be starred in a conclusion are the ones that are not undermined. Now we see that every uppercase letter is starred only once and there is only one star on the right hand side. So the argument is valid.

Example 2:

No <u>P</u>* is <u>B</u>*	Since P and B come after "no" they are distributed term. So we should undermine them. And since they are the distributed terms of a premise, we should also star them.
Some C is B	A premise which has no distributed terms. No letter should be undermined or starred.
∴Some C* is not <u>P</u>	C is undistributed and P is distributed term. So we undermine P, but we star the other letter. If we count star, we can see that every upper case is starred exactly ones and there is only one star on the right hand side. So the argument is valid.

Example 3: Induction[25]

Every motion takes place in time.	All <u>M</u>* is T.
Everything that takes place in time is created.	All <u>T</u>* is C.
Therefore, every motion is created.	∴ All <u>M</u> is C*. valid

[25] These examples are quoted from Farabi, *Short commentary on Aristotle's Prior analytics*, trans. Nicholas Rescher, University of Pittsburgh Press, Pittsburgh, 1963.

Example 4: Assertoric Syllogism

All corporeal substance is composite.	All S* is C. (first premiss)
All composite is created.	All C* is D. (second premiss)
Therefore, all corporeal substance is created.	∴ All S is D*. (conclusion) valid

In first premiss, S is distributed, in second premiss, C distributed and S is distributed in conclusion. So we undermine distributed terms. We star distributed terms of premises and the undistributed term of conclusion. Then, we can see that every uppercase is starred exactly ones and there is only one star right hand side. So the argument is valid.

Example 5: Paradigm

This A and this B are both T's.	All A* and B* are T.
This A is a C.	All A* is C.
Therefore, This B is also a C	All B is C*. invalid

Example 6: Qıyas Fiqhi

Every wine is prohibited.	All W* is P.
This (fluid) which is in the jug is wine.	j is W.
Therefore, what is in the jug is prohibited.	j* is P*. valid

Example 7. Reasoning from the seen to the unseen

All X's are Y's.	All X* is Y.
The Z's resemble the X's in a respect that it is relevant to their being Y's. (All Z is the thing which resembles the X's in a respect that it is relevant to their being Y.	All Z* is X.
Therefore, All Z's are also Y's.	∴ All Z is Y*. valid

Example 8: Categorical Syllogism

Some existing thing is composite.	Some E is C.
Every composite is created.	All C* is S.
Therefore, some existing thing is created.	∴ Some E* is S*. valid

CONCLUSION

Gensler's star test is a useful and fuctional method for checking the validity of syllogisms. But we should note that this method is useless in the conditional or the hypotetical syllogism, compound syllogisms such as the compound conditional or the compound syllogism «involving a contradiction» (qıyas al-khalf), and Darapti or Felapton types of syllogisms which are third figure (Middle terms of premises are subjects of the premises). And also we can add Fesapo or Bramantip types of syllogisms of fourth figure, enthymeme, etc. This method is also useful in categorical syllogisms, modal syllogisms, some types of compound deductions which contain two or more than two categorical syllogisms, and also in Islamic juristic deductions, demonstrative or dialectical syllogisms.

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