TEXT AND CHARACTER

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Theater is performance. The performance's very mobile reality makes it an object difficult to know. However, this is not the only motive for which research concentrates on the dramatic text. Investigation based upon methods aiming at a status of objectivity (mathematical poetry, semiotics, or structuralism) as a rule considers this text as a limit literary model and studies it under the aspect of the typology and hierarchy of the characters, or under the aspect of their strategy, or, finally, from the perspective of their geometry. The results on record (Marcus 1970, 1974; Dinu 1968a,b, 1974; Brainerd and Neufeldt 1974, etc.) are remarkable, even if contradictory, and tend, most recently, towards refinement of the proposed methods and parameters. A feeling of dissatisfaction, experienced by researchers as well as by people of the theater, persists, however. And this, we believe, is due to the fact that in research the text continues to be considered as an entity per se, although in the reality of art the conscience of the integrated character of the text in the theatrical act is more and more accentuated. It is clear that research of the text, through means however abstract they might be, must be able to be reflected in the reality of the performance, and in order that this be produced, it is necessary that the dramatic text no longer be regarded as only a literary work (and therefore as a source of pure verbal communication), but as a necessary performance (and therefore a synthesis of verbal and nonverbal communication), one out of the many possible which it contains.

Evidently, in this case, the problems are not at all simplified; on the contrary, new ones appear, such as the relationship between verbal and nonverbal communication, between the linguistic sign and the multitude of signs participating in the synthesis of the theatrical hypersign. But the real justification of knowledge of the play remains the performance.

Under this aspect, it is obvious that any dramatic text must be considered as a *set of possible interpretations,* as a *set of functionings.* In fact, the interpretation is a type of functioning, and the first analogy which can be proposed is that between the text as a whole (in the category of the sign in Peirce's acceptance of the term (1931—1935)), and the abstract automata, or even the fuzzy abstract automata (Nadin 1977). The play and its context represent the input (in the category of the object in the triadic function of the sign), the performance being the expression of

the option for a repertory of signs (the set of inner states and their succession, minimized or not) and, evidently, sense (sense, meaning, significance) embodied (as output). The functioning of the abstract automata can be studied through mathematical means. The difficulty which arises when we want to pass from the level of principle of the analogy to the operational level is that the intervening elements (parameters) are unusually numerous, some still escaping mathematical expression (quantitative or qualitative).

However, we have shown (Nadin 1977) that at the limit, the text is the very expression of the functioning of the word/words, the reflex of the profound relations between mental and verbal structures. Statistical analysis, impelled by the possibility of being carried out automatically on the computer, extended to several plays and even groups of plays (for example: Shakespeare's royal tragedies), will do much to encourage research in the functioning of the word/words in dramatic contexts, but it can really be efficacious only if it is associated with an adequate theory of interpretation of that which we call a formalized hermeneutics. The word-character analogy (suggested by Ginestier (1961)) could finally be put into use. As the functioning of a text, interpretation situates itself in the problematic of necessity and possibility with all its consequences on the semantic level. The operators of logical analysis are, in this case, modal (D.K. Lewis). The semantics of the dramatic text and its enhancement through an interpretation thus impose consideration of the extensional as well the intensional aspect, therefore a model (which attaches extensions) and an interpretation (attaching intensions). Model and interpretation, which are the object of our research — exemplified through Shakespeare's tragedy *Hamlet* (the reference edition is that of the 1623 in-folio, compared with the edition of Dover Wilson reprinted in 1961) — represent complementary unities of the text. Consequently, after definition (and exemplification) of the model and interpretation, a synthesis of these is proposed in the final considerations. Furthermore, due to the fact that research has turned up different perspectives, in the case of certain working hypotheses (especially those concerning inter-character relations as component parts of the interpretation) the results obtained are compared and the contribution of each to the actual definition of the interpretation is suggested. Where more difficult problems have appeared in the transposal of some ideas into operational methods, we have remained at the phase of enunciation of principles, and we shall be happy to find that others have made use of the ideas we have suggested (for example, in the final section).

Model

Peirce (1931–1935) observed that many icons "resemble their objects not at all in looks, it is only in respect to the relations of their parts that their likeness consists" (2.282). What are, then, these parts in the case of the dramatic text? Traditional and mathematical analyses respect the units of the text (acts, scenes). But the
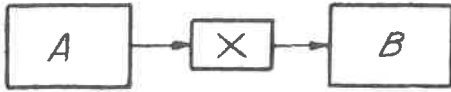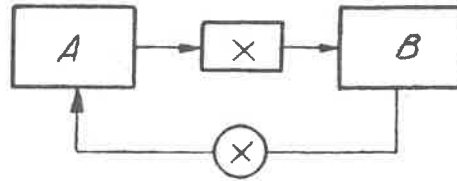
Fig. 1.

Fig. 2.

scene as well as the act are relatively arbitrary units. From one author to another, great variety can be found in the structuring in scenes and acts of the text. Moreover, in the act of interpretation per se, these units have progressively lost their significance and restructuring (in which grouping into two acts or transformation of the play into a monoact are the most common) frequently participates in staging. That is why the definition of the interpretation on the basis of the model of the text represents one of its functionings and also presupposes the establishment of those parts whose reciprocal relationship is determining for the theatrical sign.

For this, it is advisable to observe that in essence, the performance is simultaneously an act of communication and signification. It communicates the way in which characters communicate between themselves. Signification is carried out through the accomplishment of the theatrical sign, therefore, through the establishment of sense. We thus have a premise A and a conclusion B, the theater acquiring existence precisely in the space between them (fig. 1) and only for the duration of the performance. In the case of texts entered in the apperceptive background, the element of inverse connection (feedback) appears in the quality of a background knowledge which deliniates from the set I of possible interpretations associated to a model a necessary subset I_n. The dramatic work in its broadest representation (therefore including syntagmatic extensions) can be depicted through its sequential development, therefore along the length of the axis of the inner time of the action. The phrase T representing the text is decomposed in the temporally consecutive situations $S_{t_1}, S_{t_2}, ..., S_{t_m}$ defined through the relation during the length of the time of the events.

Even if the text does not usually reflect a certain regularity, it evidence the succession of well-determined segments having the nature of an event. The objective nature of this representation, which stems from direct perception of the text, the segment identifying itself with the significance, can be proven each time by considering any sequence in respect to its necessity to the development of the play. In the case of the play *Hamlet*, 51 sequences have resulted (fig. 3). An initial observation: this type of segmentation represents a cut in the set I (infinite) of interpretations, the succession of sequences having the quality of a subset (finite) of possible interpretations which can be attached to the model of the play. The text does not, in this case, present properties of repetitiveness or symmetry. After fig. 3 are given the event sequences through the lines which constitute their "definition" from within the play. Sequences 1, 2, 3 represent the logical and aesthetical premises of the
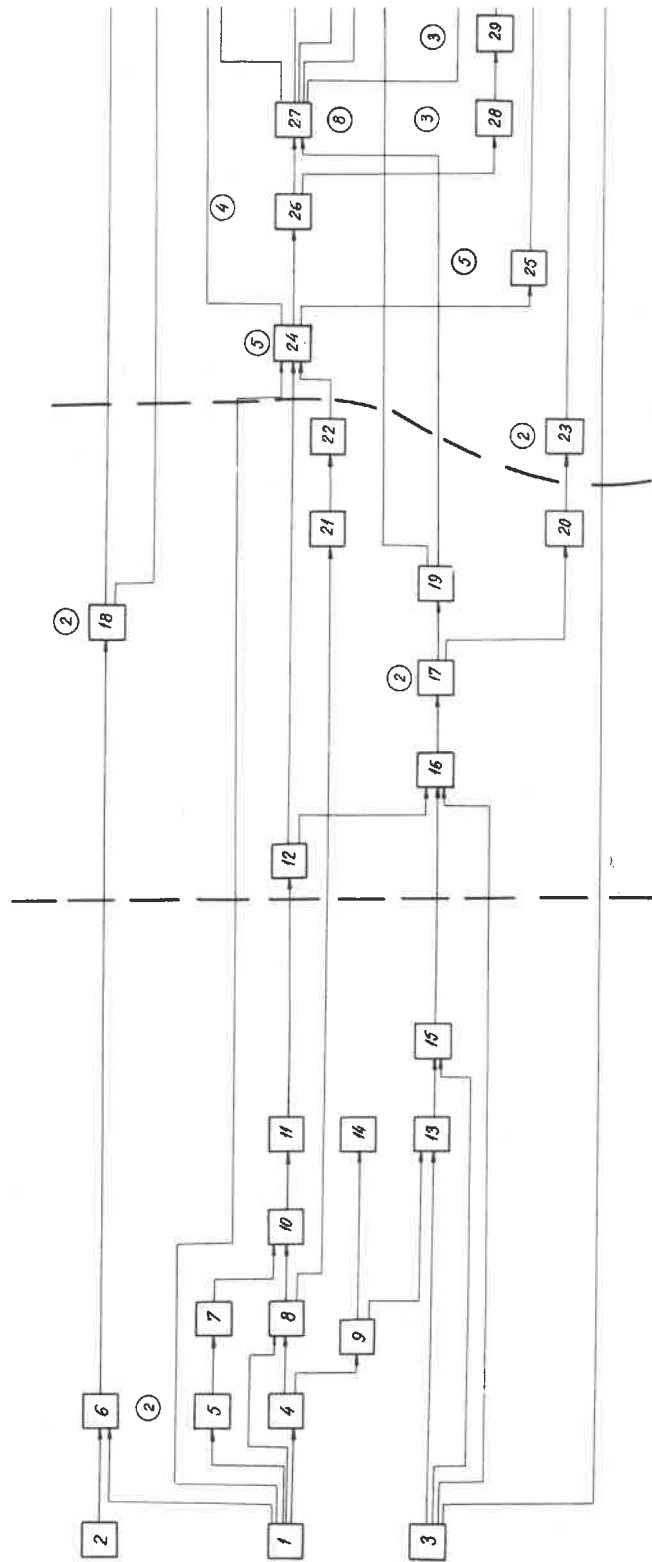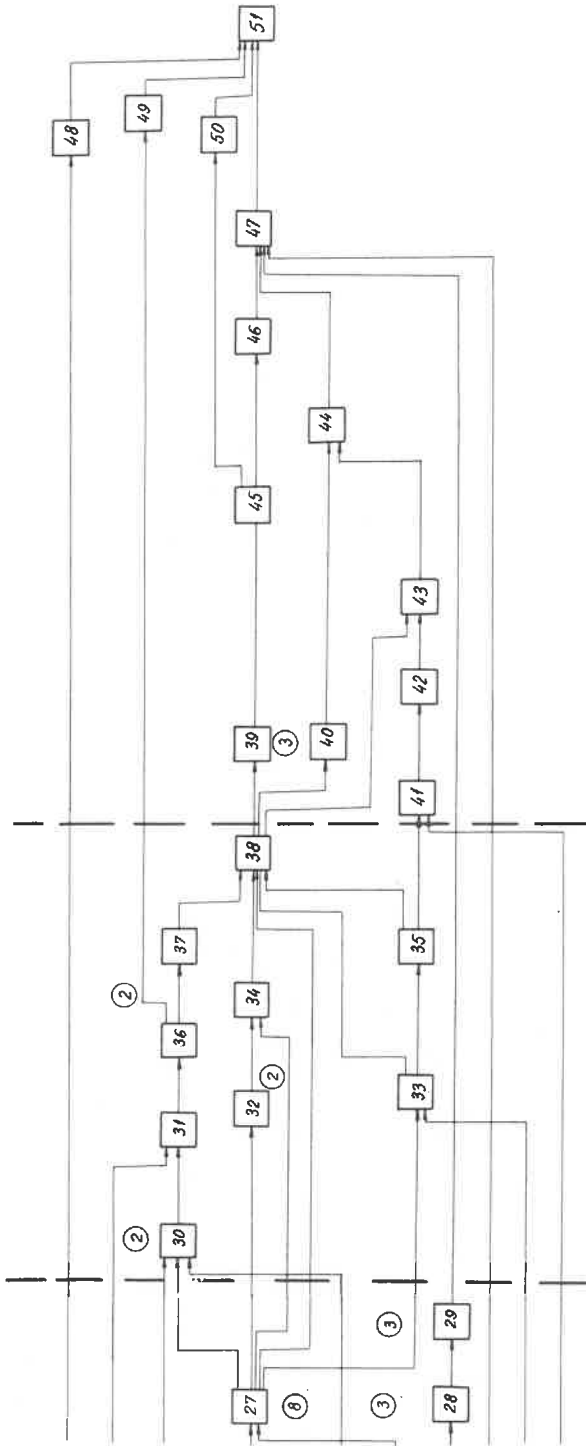
Fig. 3.

Sequences

1. G: Murder most foul (I, 5, 27)

2. Ho: ...he the ambitious Norway combated (I, 1, 60)

3. H: ...never doubt I love (II, 2, 119)

4. K: Therefore our sometime sister, now our queen Have we (...) Taken to wife! (I, 2, 8-14)

5. Ho: ...has this thing appeared to night? (I, 1, 19)

6. K: ...we here dispatch You good Cornelius, and you Voltimand, For bearers of this greeting to old Norway (II, 2, 35)

7. Ho: ...we did think it writ down in our duty To let you know of it (I, 2, 222)

8. H: It is not, nor it cannot come to good (I, 2, 159)

9. K: Take thy fair hour, Laertes (I, 2, 63)

10. H: If it assume my noble father's person, I'll speak to it (I, 2, 244)

11. G: Revenge his foul and most un-natural murder (I, 5, 25)

12. H: How strange or odd soe'er I bear myself (I, 5, 170)

13. L: Then weight what loss your honour may sustain (I, 3, 29)

14. P: ...to make inquire Of his behaviour. (II, 1, 3-4)

15. P: ...have you given him any hard words of late (II, 1, 108)

16. O: I did repel his letters (II, 1, 110)

17. P: ...I have found The very cause of Hamlet's lunacy (II, 2, 49)

18. V: Most fair return of greetings and desires (II, 2, 60)

19. K: Do you think 'tis this? (II, 2, 153)

20. P: ...I'll loose my daughter to him (II, 2, 163)

21. K: ...have you heard Of Hamlet's transformation (II, 2, 4-5)

22. K: ...I know the good king and the
        queen have sent for you
                                    (II, 2, 293)

23. H: To a nunnery, go.   (III, 1, 158)

24. H: There is a play to-night before the
        king   (III, 2, 86)

25. K: ...O, my offence is rank, it smells
        to heaven   (III, 3, 36)

26. P: The queen would speak with you
                                   (III, 2, 419)

27. H: I took thee for thy better;
                                   (III, 4, 12)

28. H: Do you not come your tardy son
        to chide   (III, 4, 106)

29. G: ...this visitation
        Is but to whet thy almost blunted
        purpose   (III, 4, 111)

30. K: By letter conjuring to that effect

        The present death of Hamlet
                                   (IV, 3, 57)

31. C: They are of Norway, sir
                                   (IV, 4, 49)

32. M: ...young Laertes in a riotous
        head   (IV, 5, 101)

33. K: ...poor Ophelia
        Divided from herself, and her fair
        judgement   (IV, 5, 84–85)

34. L: ...only I'll be revenged
                                   (IV, 5, 135)

35. Q: ...your sister's drowned, Laertes
                                   (IV, 7, 168)

36. H: He should those bearers put to
        sudden death   (V, 2, 46)

37. H: "To-morrow shall I beg leave to
        see your kingly eyes
                                   (IV, 7, 45)

38. L: ...for that purpose I'll anoint my
        sword   (IV, 7, 143)

39. H: These foils have all a length?
                                   (V, 2, 282)

40. K: Here's to thy health; give him the
        cup   (V, 2, 301)

41. C: Is she to be buried in Christian
        burial   (V, 1, 1)

42. H: ...What wilt thou do for her?
                                   (V, 1, 293)

43. Os: The king, sir, hath laid sir ... (V, 2, 173)
44. Q: The drink, the drink! I am poisoned (V, 2, 327)
45. Laertes wounds Hamlet; then, in scuffling, they change rapiers, and Hamlet wounds Laertes
46. L: ...the king, the king's to blame (V, 2, 337)
47. H: The point envenomed too! Then, venom, to thy work (stabs the king) (V, 2, 338)
48. Os: Young Fortinbras, with conquest from Poland (V, 2, 367)
49. ea: ...Rosencrantz and Guildenstern are dead (V, 2, 389)
50. Fo: For me, with sorrow I embrace my fortune (V, 2, 405)
51. Fo: ...for his passage, The soldiers' music and the rites of war (V, 2, 415—416)

Fig. 3.

text, defining its main sub-phrases; that is, King Hamlet was killed (1); the Norwegians were defeated (2); Prince Hamlet loves Ophelia (3), respectively: "Murder most foul" (I, 5, 27); "He the ambitious Norway combated" (I, 1, 60); "Never doubt I love" (II, 2, 119). As one commentator (Wain 1964) of the text says, Shakespheare uses, in order to write this tragedy of revenge, "the basic ingredients for this *genre*": love, murder, revenge.

Around these premise lines, the elements conferring their degree of importance in the text accumulate. In way of exemplification: Fortinbras' preparations for war are interpreted as the desire to regain lost territory, and hence, the decision to send Cornelius and Voltmand as heralds (I, 2, 23–35); or, along the line of the murder of King Hamlet and in its continuation, the marriage between Claudius and Gertrude (I, 2, 8–14); or, finally, Laertes' warning to Ophelia before his return to France (I, 3, 29–30).

T.S. Eliot, who considers *Hamlet* "most certainly an artistic failure" (an opinion shared by Papini) states: "the only way of expressing emotion in the form of art is by finding on 'objective correlative'; in other words, a set of objects, a situation, a chain of events which shall be the formula of that particular emotion." Segmentation evidences the existence of such a chain of events. Wain sarcastically remarks about T.S. Eliot: "The word 'formula' dates this passage very clearly as belonging to the period when, for various reasons, it was felt that literary criticism should borrow terms from the laboratory." In the meanwhile, these "various reasons" became quite clear.

The reading of the play in the succession of the sequences is equivalent to a compression and is accompanied by all the consequences of this compression. But it has the merit, easy to ascertain upon examination of the model, of evidencing the degree of necessity of each sequence and thus, indirectly, its participation in the production of sense/senses (rather than that of emotion) in the whole text. An example: the killing of Polonius (sequence 27) — which theoretical as well as scenic interpretations understimate — manifests its essential nature in the actual functioning of the whole. If, *ad absurdum,* an interpretation were to eliminate it or to exaggeratedly assign it to a secondary level, the whole ulterior development would become, from a logical and aesthetical point of view, impossible.

This type of progression, corresponding to the extensional analysis, associates a concrete, well-determined sense to each sequence and points out the internal connections of the text. On this basis, it is possible to suggest the more abstract model of the way in which is transmitted, from one sequence to another and from one act to another, complex semantic information, on the basis of which the functioning of the whole is brought about (fig. 4). Using an analogy with terms from the study of the phenomena of propagation, "transmittance" can be adopted as a measure of the transfer of effect (logical, aesthetic, or any other kind), from any sequence to another. Transmittance expresses, at least intuitively, the participation of each part in the realization of the whole, therefore the contribution of the partial senses to the general sense (i.e. the accomplishment of the function of signification). A
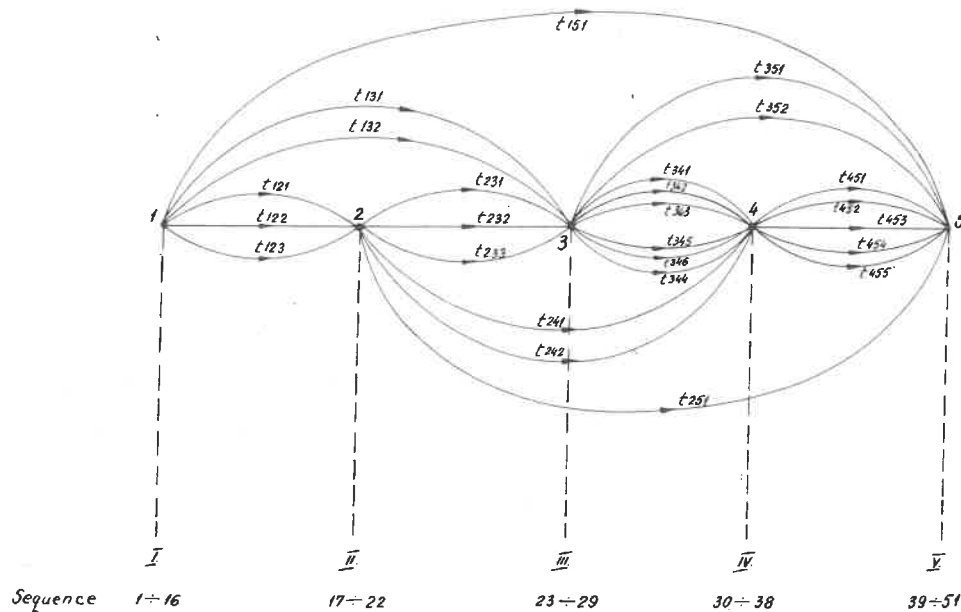
Fig. 4.

matrix can be associated to the oriented graph corresponding to the sequential model. A precise expression (quantitative) cannot be given, at least in the current state of research, to this transmittance, but the passage from sequential progression to the abstract, based on coefficients of interinfluence, can suggest the rigor of the structuring of the whole. Event-segments can, in principle, lead to the revelation of semantic marks — as a necessary step in approaching the text from the perspective of generative grammars, in the sense suggested by Marcus (1975). However, we have not selected this path — possibly due to principle, although it is, moreover, very attractive — preferring to prepare the passage from the extensional aspect, which the sequential analysis has, to the intensional aspect. The sequences do not illustrate, as neither do the scenes, acts or situations, the types of relations between characters. The statistical analysis of presence or absence, compared with probabilistic distribution, is a measure of the manner in which each play is a law unto itself, and every author his own legislator. Without renouncing this type of determination, which we have still tried to subject to perfectioning, we consider it necessary to proceed from the sequences (event-segments) to that which we shall call *acteme* (as in the form "morpheme") and which represents, for a given play, the interactions between characters. It is a question of the way in which the characters decide: (a) their own actions, or (b) the actions of others, i.e. the elementary two-person zero-sum game. For example: Claudius kills his brother, or permits Laertes to leave for France, etc. Other actions are reciprocal: Claudius marries Gertrude; Gertrude marries Claudius. Certain desired actions will not come about: Claudius wishes the death of Hamlet

and asks the English, through a letter entrusted to Rosencrantz and Guildenstern, to carry out the crime. Finally, there exist actions which concern only the one who undertakes them; for example: Horatio decides to see the ghost. The "result" of each acteme is the result of the elementary game considered. For two characters c_i and c_j in the play, these actions (gains) will be represented either in a digraph or through the sequence of their indices: $i\,j$ if c_i decides and c_j carries out the decision; $i\,j$ and $j\,i$ — reciprocal actions; $j\,i$ if c_i decided and c_j did not execute the decision; $i\,j$ — decision involving one's own person. Shakespeare's play gives evidence, through the passage from sequences (event-segments) to decision-segments (elementary games), of 86 actemes. Example: $2\ 4$ (that is, c_2 influences c_4). The Queen asks Hamlet to renounce his departure to Wittenberg:

> Q: Let not thy mother lose her prayers, Hamlet: I pray thee, stay with us; go not to Wittenberg.
>
> H: I shall in all my best obey you, madam. (I, 2, 118—120)

Considering the segment identical with the significance it bears, without foreseeing, for instance, that Hamlet gives in to the King's requests, obeying with an ulterior motive (actually dominating, but deceiving him), every such interaction is to be codified step by step in the form shown (every game considered isolated). Certain sequences are identical with an acteme; others contain two or more actemes. The distribution of the characters in actemes — therefore in dynamic theatrical units of action and reaction — and in particular their presence alone, in couples, in triplets, etc. is a significant theatrical distribution since it concerns not arbitrary units (such as scenes or acts) but more precisely cells of decision, of conflict and dramatic tension. The set C of *Hamlet* presents itself *in extenso,* thus: {Claudius (K), Hamlet (H), Polonius (P), Horatio (Ho), Laertes (L), Voltimand (V), Cornelius (C), Rosencrantz (R), Guildenstern (Gu), Osric (Os), A gentleman (g), A priest (p), Marcellus (Ma), Bernardo (Be), Francisco (Fr), Reynaldo (Re), Players (Pl), Two clowns (c), Fortinbras (Fo), A Norwegian Captain (n), English Ambassadors (ea), Gertrude (Q), Ophelia (O), Lords (1), Ladies (la), Officers (o), Soldiers (s), Sailors (sa), Messengers (m), other Attendants (at), Ghost (G)}. The configurations of the actemes are the following: $C_1 = \{G, Ho, Ma, Be\}$; $C_2 = \{K, Q, C, V\}$; $C_3 = \{K, Q, P, L\}$; $C_4 = \{K, Q, H\}$; $C_5 = \{H, Ho, Ma, Be\}$; $C_6 = \{H, Ho, Ma, Be\}$; $C_7 = \{H\}$; $C_8 = \{L, O\}$; $C_9 = \{P, L. O\}$; $C_{10} = \{P, O\}$; $C_{11} = \{H, G, Ho, Ma\}$; $C_{12} = \{Ho, Ma\}$; $C_{13} = \{H, G\}$; $C_{14} = \{H, G, Ho, Ma\}$; $C_{15} = \{P, Re\}$; $C_{16} = \{P, O\}$; $C_{17} = \{K, Q, R + Gu, at\}$; $C_{18} = \{K, Q, at\}$; $C_{19} = \{K, Q, P, at.\}$; $C_{20} = \{K, Q, at\}$; $C_{21} = \{K, W, C, V, at\}$; $C_{22} = \{K, Q, P, at\}$; $C_{23} = \{P, H\}$; $C_{24} = \{H, R + Gu\}$; $C_{25} = \{P, H, R + Gu, Pl\}$; $C_{26} = \{H, R + Gu, Pl\}$; $C_{27} = \{K, Q, P, O, R + Gu\}$; $C_{28} = \{K, Q, P, O\}$; $C_{29} = \{K, P, O\}$; $C_{30} = \{H, O\}$; $C_{31} = \{O\}$; $C_{32} = \{K, P\}$; $C_{33} = \{H, Pl\}$; $C_{34} = \{H, P, R + Gu\}$; $C_{35} = \{H, Ho\}$; $C_{36} = \{K, Q, P, H, Ho, O, R + Gu, 1, at\}$; $C_{37} = C_{36}$; $C_{38} = \{C_{37} + Pl\}$; $C_{39} = C_{38}$; $C_{40} = C_{39}$; $C_{41} = \{H, Ho\}$; $C_{42} = \{H, R + Gu\}$; $C_{43} = \{C_{42} + P\}$; $C_{44} = \{H\}$; $C_{45} = \{K, R + Gu\}$; $C_{46} = \{K, P\}$; $C_{47} = \{K\}$; $C_{48} = \{H\}$; $C_{49} = \{K\}$; $C_{50} = \{Q, P\}$; $C_{51} = \{Q,$

ACT I / ACT II

Scene	1	2	2	2	2	2	2	3	3	4	4	5	5	5	1	1	2	2	2	2	2	2	2	2	2
Verse	1-170	1-40	40-60	60-130	130-170	170-250	255-260	1-55	55-85	85-135	1-85	85-90	1-90	90-110	110-190	1-75	95-120	1-40	53-58	60-85	85-170	170-295	225-405	405-575	575-645
Characters / scene	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1. Claudius (k)		1	1	1														1	1	1	1	1				
2. Gertrude (Q)				1														1	1	1		1				
3. Polonius (P)			1					1	1							1	1		1			1	1		1	
4. Hamlet (H)				1	1	1	1				1		1	1	1							1	1	1	1	
5. Ghost (G)	1										1		1		1											
6. Horatio (Ho)	1					1					1	1			1											
7. Laertes (L)			1					1	1																	
8. Ophelia (O)								1	1	1							1									
Number of characters	2	1	3	3	1	2	1	2	3	2	3	1	2	1	3	1	2	2	3	2	1	3	2	1	2	1

9. Rosencrantz + Guildenstern (R+Gu)

10. Players (Pl.)

11. Others

ACT III

Scene	1						2	2										3					4					
Verse	1-16	16-43	43-55	55-157	157-170	170-197	1-55	55-64	64-102	102-110	110-120	120-122	122-185	185-305	305-330	330-615	615-430	430-	1-25	25-35	35-70	70-95	95-97	1-7	7-25	25-30	30-100	100-135	135-215
Characters / scene	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
1. Claudius (k)	1	1	1			1				1				1					1	1	1		1						
2. Gertrude (Q)	1	1									1		1											1	1	1	1	1	1
3. Polonius (P)	1		1			1		1			1	1	1			1				1				1	1				
4. Hamlet (H)				1			1	1	1	1	1	1	1	1	1	1	1	1			1				1	1	1	1	1
5. Ghost (G)																												1	
6. Horatio (Ho)									1							1													
7. Laertes (L)																													
8. Ophelia (O)		1	1	1	1							1	1																
Number of characters	3	3	3	2	1	2	1	2	2	2	2	3	2	5	2	1	2	1	1	2	1	1	1	2	2	3	2	3	2

9. Rosencrantz + Guildenstern (R+Gu)

10. Players (Pl.)

11. Others

ACT IV / ACT V

Scene	1	2	3	4	5								6	7	1					2											
Verse	1-46	1-30	1-70	1-65	1-15	15-35	35-38	38-95	95-115	115-130	130-200	200-220	1-35	165-195	80-215	215-235	235-265	265-315	315-370	1-80	80-195	195-270	270-275	275-305	305-310	310-325	325-335	335-340	340-365	365-400	
Characters / scene	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
1. Claudius (k)	1		1					1	1	1		1		1	1				1	1						1	1	1			
2. Gertrude (Q)	1					1	1	1	1	1					1				1							1	1				
3. Polonius (P)																															
4. Hamlet (H)		1	1	1												1	1	1	1		1	1	1	1	1	1	1	1	1	1	
5. Ghost (G)																															
6. Horatio (Ho)					1							1		1		1	1		1		1	1	1				1			1	1
7. Laertes (L)									1	1	1		1	1				1						1	1	1	1	1	1		
8. Ophelia (O)						1	1	1			1																				
Number of characters	8	1	2	1	3	1	2	2	2	3	2	2	1	2	3	2	2	2	4	1	2	2	2	2	3	4	5	2	2	2	1

9. Rosencrantz + Guildenstern (R+Gu)

10. Players (Pl.)

11. Others

Presence	Absence	Probability of appearance	Hierarchy	Entropy (H)	
1	0				
32	54	32/86 = 0,37	H	0,9928	②
25	61	25/86 = 0,29	K	0,95	③
20	66	20/86 = 0,23	Q	0,868	④
48	38	48/86 = 0,55	P	0,778	①
5	81	6/86 = 0,07	Ho	0,7219	⑦
16	70	17/86 = 0,20	L	0,6348	⑤
15	71	15/86 = 0,17	O	0,6342	⑥
13	73	14/86 = 0,16	6	0,3660	⑥

Fig. 5.

H}; C_{52} = {Q, P, H}; C_{53} = {Q, H}; C_{54} = {H, G}; C_{55} = {Q, H}; C_{56} = {K, Q, R + Gu}; C_{57} = {H, R + Gu}; C_{58} = {K, H, R, + Gu, s}; C_{59} = {H, R + Gu, n}; C_{60} = {Q, Ho, g}; C_{61} = {Q, O}; $C_{62} = C_{61}$; C_{63} = {K, Q, Ho, O}; C_{64} = {K, Q, L, m}; C_{65} = {K, Q, L}; C_{66} = {K, L, O, s}; C_{67} = {K, L}; C_{68} = {Ho, sa}; C_{69} = {K, L, m}; C_{70} = {K, Q, L}; C_{71} = {H, Ho, c}; C_{72} = {H, Ho}; C_{73} = {K, Q, L, p, at}; C_{74} = {C_{73} + H, Ho}; C_{76} = {H, Ho}; C_{77} = {H, Ho, Os}; C_{78} = {H, Ho, 1}; C_{79} = {K, Q, H, Ho, L, Os, 1, at}; $C_{80} = C_{79}$; $C_{81} = C_{80}$; $C_{82} = C_{81}$; C_{83} = {K, H, Ho, L, Os, 1, at}; $C_{84} = C_{83} - K$; $C_{85} = C_{84} - L$; C_{86} = {Ho, Os, Fo, ea, 1, at}.

The identical, minimal and maximal configurations can be easily determined. An operative model of the sequence of the actemes is given in fig. 5, where from the complete configurations as listed above only those essential to decisions (intensional aspect) were retained. The matrix elaborated on the basis of the distribution of the characters in the actemes represents, as well as its normalized form, the type of interactions. The influence exercised by each character is expressed through the values on the rows; the influence felt is reflected by the values on the columns.

	K	Q	P	H	G	Ho	L	O	Fg	n_i	$n_i - n_{ii}$
K	4	3	3	4	0	0	5	0	3	22	18
Q	0	1	0	4	0	0	1	1	1	7	6
P	4	1	3	0	0	0	1	3	0	12	9
H	4	1	3	3	1	5	0	1	3	21	18
G	0	0	0	4	1	1	0	0	1	7	6
Ho	0	1	0	1	1	0	0	0	0	3	3
L	2	0	0	2	0	0	3	2	0	9	7
O	0	0	0	0	0	0	0	1	0	1	0
Fg	2	0	0	1	0	2	0	0	0	5	5
n_j	16	7	9	19	3	8	10	8	7	87	
$n_j - n_{jj}$	14	6	6	16	2	8	7	7	7		71

In this manner, the extensional problematic analysis, which led to the model of the play unfolded in actemes, is necessarily extended in the intensional problematic, showing the fact that to the model should be attached a corresponding theory of interpretation.

Interpretation

As has been shown (Montague 1969), interpretation attaches intensions. The unity between model and interpretation (consistency) determines the significant nature of the results obtained in these two directions. In essence, an interpretation is an ordered triad W, U, F fulfilling the following conditions:

1. W is the set of all possible worlds, in this case, naturally, scenic worlds;

2. U is the set of all possible individuals, so that $U = U_i E_i$ $(i \in I)$, with E_i $(i \in I)$ being the set of individuals existing in the possible scenic worlds. It is obvious that the set U is not summed up in the set C of characters, but includes the audience also.

Any property (for example: love, hate, acceptance, rejection, sincerity, hypocrisy, etc.) is represented by the function which assigns to each possible scenic world a set of possible individuals, i.e. the set of effective characters, who in that world, part of the interpretation, have a given property (or a set of properties).

3. F is a function of which the domain is the set of predicate constants and individual constants (as expressed through our language, i.e. verbal communication). The director's stage indications and those of the author (as expressed in the play, directly or not) or of the interpreters (scenographer, composer, actors, etc.) involved in the synthesis represented by the performance are reunited in this function F which we shall call the *functioning* of the text in the performance.

It must be pointed out that between the real set of characters $C = \{c_1, c_2, ..., c_n\}$ of a text, and the set $C = \{c_1, c_2, ..., c_i\}$ where $i < n$, considered relevant for the analysis, or which it can effectively comprise in calculation, a difference usually exists. Any number of justifications can be found for this; in fact, it is a question of a decline in the play's complexity, the difference $C - C'$, represented by the subset $C'' = \{c_j, c_k, ..., c_n\}$ on the assumption that the sets are ordered and the criteria are well determined, should subsequently always be attached, as an orientation point, to the interpretation being established. The set C of *Hamlet* as already given imposes several preliminary observations before adopting the set which will effectively be taken into consideration. There exists a great number of characters implicated in the figuration (denoted Fg). Its role is, in general, that of emphasizing certain events in regard to clarifying those decisions which define the acteme. The figuration comprises, as a rule, the passive characters. Even certain characters bearing a name serve the same purpose of figuration. For instance, from the first in-quarto (1604) in which the play appears to the next one (1605), the character "an anonymous gentlemen" becomes Osric, without the author's having identified him as a

real type (the analogy with Polonius, in what concerns his speaking style is evidently unfounded). The information (logical, aesthetical) brought by *a Norwegian Captain*, the *English Ambassadors, Messengers,* etc. is always transmitted to the main characters who repeat it as such.

In the possible world W populated by the set of individuals U in the ordered triad of the interpretation, it is clear that all characters must be considered. But when we proceed to attaching intensions, we are entitled to retain only those who participate in actemes. Subsequently, we shall continue to refer to the model already established (and which is logically controlled by that of the sequences). Things are very clear concerning a prime group: Claudius, King of Denmark (K), Gertrude, Queen of Denmark and mother to Hamlet (Q), Polonius, lord Chamberlian (P), Hamlet, son to the late and nephew to the present King (H), Ghost of Hamlet's father (G), Horatio, friend of Hamlet (Ho), Leartes, son to Polonius (L), Ophelia, daughter to Polonius (O), therefore the subset {K, Q, P, H, G, Ho, L, O}.

It is the same, following the sequential development, with Reynaldo, servant to Polonius, who appears in an isolated segment (14, in fig. 3) and can therefore be ignored. likewise for the *Two clowns, grave diggers* and several other groups of the figuration. Rosencrantz and Guildenstern, Courtiers, can of course be the group (R + Gu), as well as Voltimand and Cornelius (C + V), whose weight in the drama is substantially smaller. The fact that all of them (the group of the Courtiers) are merely an object of decisions made by others (King, Hamlet) justifies, from the very beginning, ignoring them as individuals, and considering them in the general calculation of the hierarchy of characters as part of Fg. In the logical calculation of dominations they will be considered as such. We have verified this hypothesis and indeed the values obtained do not modify the general results. In the case of the operation of establishing nuclei (in scenes or acts), their integration in the character collectively represented by all the others (Fg) is no longer possible. These observations also remain valid for the other intensional aspects pursued (for example, the matrix of similarity).

We shall not comment now on the results of the analysis of hierarchy (ordering the set of characters as follow: H, K, Q, P, Ho, L, O, G, Fg), considering that they can become relevant in the relationship to other aspects regarding the condition of the characters and the potential coefficient of influencing which they have on one of the interpretations from the set I of those possible. The result obtained is a necessary intermediary for establishing the index of similarity (regarding the classes of equivalence) of the characters. Let there be a character c_i from the set C of the cardinal N with K as the maximum number of characters in one of the actemes. It is clear that $1 < K \leqslant N$.

The matrix of the presence of each character c_i of the uninterpreted play in a

group of K characters is:

	1	2	... K	Total
p_1	a_{11}	a_{12}	a_{1K}	a_1
p_2	a_{21}	a_{22}	a_{2K}	a_2
$\vdots$				
p_i	a_{i1}	a_{i2}	a_{iK}	a_i
$\vdots$				
p_n	a_{n1}	a_{n2}	a_{nK}	a_n
	b_1	b_2	... b_k	

The sum on the row (a_i) indicates the total number of presences of the character c_i in the given text. The sum in column (b_K) indicates the number of presences of the grouping of several characters (how many groups of K characters). The matrix can be normalized so that the sum in each row or column be equal to the unit. A finite set of probabilities can thus be defined (subsequent to the assimilation of the relative frequencies of occurence with probability). Opposed to the matrix of real probabilities are:

(a) the matrix of calculated probabilities (how many times are, during the play, the characters to be together in groups of K?);

(b) the matrix of probabilities transposed in the performance, i.e. the real chain of actemes chosen from the model of the play. The last matrix is never identical to the first or the second.

Thus we have the possibility to confront the relation of order as given by change, by the writer and by the interpreters. The distance (difference expressed in absolute values) between them belongs to the set of attributes defining every interpretation. It was already shown that this distance, in units normalized or not, is an index specific to a play, and a measure (partial) of its originality. The deviation from the probabilistic law of distribution cannot be, however, considered as a parameter in itself and its significance should not be exaggerated. In the case of the text chosen, and in view of the specification made concerning the list of characters, we obtain, for example, the following table of results of the degree of utilization of the combinations of K characters ($K = 1, 2, ..., 8$).

K	8	7	6	5	4	3	2	1	
Real	0	0	0	2	2	12	16	6	38
C_8^K	1	8	28	56	70	56	28	8	199
r/C_8^K	0	0	0	0.035	0.028	0.214	0.571	0.750	0.190
Rank		6	·	4	5	3	2	1	

This table can be rewritten taking into consideration not only the nucleus of the eight main characters. In reality, and therefore keeping in mind the whole cast (24 characters plus the figuration, the relation r/C_n^K ($n = 24 + Fg$), which synthetically indicates the difference between the real matrix and the theoretical one, is even smaller. The matrix of one of the possible interpretations can deviate plus or minus from the real value. This type of deviation can be expressed through the value of redundancy.

Simultaneous or individual presence in an acteme or in a set of actemes in the play is, for the reasons already emphasized, more relevant than that in the units of scene, situation, or act. A complete class A of attributes of the set of characters $C = \{c_1, c_2, ..., c_n\}$ is practically impossible to determine (see here attibutes such as age, sex, psychology, social condition, education, consistency, belief, etc.). If we call an attribute any element of the fuzzy set $A = U_{j\epsilon 0}^P A_{j_1}$, and if we label the attributes, up to a certain index of relevance, then $A = \{a_1, a_2, ..., a_r\}$, the function $a : C \rightarrow [0,1]$ being fuzzy determined, that is, there exists no clearcut transition from the membership to the non-membership of an attribute in the set defining a character c_i under consideration. The complexity of dramatic types leads to abandoning the clearcut function of membership to a set and justifies the use of the fuzzy function of membership, i.e. $\varphi_G : K \rightarrow R$, where φ_G is the degree of membership, associating to every $x \epsilon X$ a real number from the interval $[0,1]$. We shall not develop, in this paper, such a model — particularly promising due to the actual complexity of the problem of the mathematical definition of the characters. We shall consider, from among the set of attributes, those which clearly show the characters present (but which do not deal with the type of characters, a problem to be solved with fuzzy set applications), individual or simultaneous, in the actemes, as well as the attribute of the exercise of power or of domination.

We have to introduce the parameters of similarity (proximity) in order to suggest a more efficient way of establishing the characteristic configurations of each play. In this sense we have to use the function of similarity and apply it successively to the sets of presence in respect to the sets of characteristic of dominations and to the set of characters under consideration. A function α which establishes an application $\alpha : X \times Q \rightarrow R$ is called a function of similarity over the set $X \times Q$, thereby

fixing to each pair (x, q) of elements from $X \times Q$ a real number so that

$$[\forall x \in X] \; (\alpha(x, q) = (q, x))$$

$$[\forall x \in X] \; (x = q \rightleftharpoons (x, q) = 1)$$

More such possible functions exist (cosine, hypersine, Maron-Kuhns, etc.) from whose ranks we have chosen the α_{PRN} (the Parker-Rhodes, Needham function (Parker-Rhodes and Needham 1960)), which is expressed in its generality through

$$\alpha_{PRN} = \frac{\sum_{k=1}^{n} d_k(x) \, d_k(q)}{\sum_{k=1}^{n} d_k^2(x) + \sum_{k=1}^{n} d_k^2(q) - \sum_{k=1}^{n} d_k(x) \, d_k(q)}$$

In the case where the vectors x and q are binary (in our case presence, absence, domination, dominance), the relation leads directly to the Jaccard indices, therefore

$$\alpha_{PRN} = J(x, q) = \frac{s}{s + u + v}$$

in which s is the number of actemes in which characters c_i and c_j are simultaneously present, therefore in the effective interaction, and u, respectively v, the number of actemes in which only the character c_i, respectively c_j is present. The corresponding matrix, called the matrix of similarity, has on its main diagonal the value 1 (each character is similar to itself). The sum of the elements on a row/column is an index of the centrality of the characters. This is important for the determination of a given interpretation, since it permits the establishment of the characters around whom gravitate all the other couples. The matrix is given in its regular form and in the form after fuzzy separation (the 3rd iteration).

	K	Q	P	H	G	Ho	L	O	$\Sigma - 1$
K	1	0.39	0.18	0.09	0	0.004	0.17	0.12	0.99
Q	0.39	1	0.18	0.12	0	0.005	0.11	0.08	0.93
P	0.18	0.18	1	0.13	0	0	0.06	0.17	0.72
H	0.09	0.12	0.13	1	0.08	0.25	0.12	0.05	0.84
G	0	0	0	0.08	1	0.13	0	0	0.21
Ho	0.04	0.05	0	0.25	0.13	1	0.03	0	0.50
L	0.17	0.11	0.06	0.12	0	0.03	1	0.12	0.61
O	0.12	0.08	0.17	0.05	0	0	0.12	1	0.54

The matrix can acquire increased relevance if it is submitted to the operation of fuzzy separation. The separation theorem is applied in order to define the dimen-

sions of the groups, that is, the determination of the degree of the selection. Thus we put in evidence the superimpositions of different configurations of characters bearing a similar or a different significance. The theorem, which we shall not demonstrate (Parker-Rhodes and Needham 1960), on which the fuzzy separation of a matrix can be effected (basically an iteration of a more refined type) is enunciated thusly: In the space X, n dimensional, let $G_i G_j$ and $G_k = G_i G_j$ be fuzzy convex sets, contiguous with $M_i = \sup_i(x)$, $M_j = _j(x)$, $M_k = \sup_k(x)$, then $1 - M_k$ is the greatest degree of separation of the sets G_i and G_j which can be realized with a hyperplane H in X.

If we express the relations studied under the form of a symmetrical matrix with $a_{ij} = a_{ji}$, to effect the fuzzy separation means to substitute element a_{ij} with the value a'_{ij}, i.e.

$$a'_{ij} = \max_{1 \leqslant k \leqslant n} \min (a_{ik}, a_{kj}),$$

that is, to choose from among the pairs on the same row/column the minimum values, and from this series to select the maximum value. The fuzzy separation is repeated on the matrix until the stabilization of the values of the matrix. We thus obtain classes of fuzzy (and fuzzy exclusive) equivalence.

	K	Q	P	H	G	Ho	L	O	$\Sigma - 1$
K	1	0.39	0.18	0.13	0.13	0.13	0.17	0.17	1.30
Q	0.39	1	0.18	0.13	0.13	0.13	0.17	0.17	1.30
P	0.18	0.18	1	0.13	0.13	0.13	0.17	0.17	1.09
H	0.13	0.13	0.13	1	0.13	0.25	0.13	0.13	1.03
G	0.13	0.13	0.13	0.13	1	0.13	0.13	0.13	0.92
Ho	0.13	0.13	0.13	0.13	0.13	1	0.13	0.13	1.03
L	0.17	0.17	0.17	0.13	0.13	0.13	1	0.17	1.07
O	0.17	0.17	0.17	0.13	0.13	0.13	0.17	1	1.07

The classes of fuzzy equivalence:

$\{K, O\}_{0.39}$; $\{K, Q, P\}_{0.18}$; $\{K, Q, P, L, O\}_{0.17}$; $\{H, Ho\}_{0.25}$.

$\{K, Q\}_{0.39}$; $\{H, Ho\}_{0.25}$; $\{P, L, O\}_{0.17}$; $\{G\}_0$ (see fig. 6)

We shall return to the meaning of the results which indicate such proximity as that between K and Q, H and Ho, or the isolated position of G. The fact is that recent interpretations (Fluchère, Müller, Kott) have raised the problem of "kinship" of the play considering that an objective criterium should be established in order to modify the image of "solitary avenger" which was used traditionally in order to characterize Hamlet.
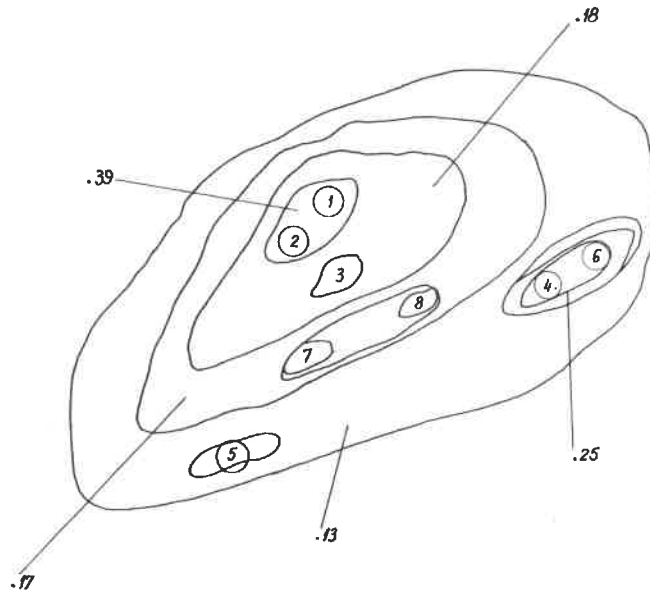
Fig. 6.

In the same way can be determined the Hamming distance $d(i,j) = u + v$ which becomes significant upon definition of the play's nuclei. The relatively high number of nuclei (which would increase if we implied in the calculation the whole list of characters) is an index of its interpretivity, prefiguring a set of interpretations on the order of the possible combinations. Each class of interpretations reflects the fact that from the set N of a play's nuclei the interpreter (reader, director, critic, etc.) has chosen a subset N'. This subset belongs to the set of attributes involved in the definition of I (influencing the set of all possible individuals from the possible scenic worlds).

Finally, alongside the fuzzy separation, we can attach to each character c_i, normalizing the real number of presences in the w actemes of the text, a value of entropy $H_i = \Sigma_{j=1}^{2} p_{ij} \log_2 p_{ij}$, with p_{ij} as the probability of a character's presence in an acteme. The hierarchy of the characters thus resulting (fig. 5) does not differ from the hierarchy already established. The values obtained can, however, be used in completing the intensional analysis.

It is not surprising — the fact was noticed by the play's admirers as well as by a few of its detractors — that Hamlet is located at the head of the hierarchy; neither, perhaps, is it surprising that he is followed by K, Q, etc. The associated entropy gives evidence of the nature of surprise of some from among the events — for instance, the failure of the assassination attempts and Hamlet's letter to the king announcing his return, his presence at the cemetery and other things, culminating with the high entropy of the entire scene of the duel, which imposes that the interpretation not add entropic elements (through details which vie with the entropy of

the final actemes), but which make those of the text stand out, projecting them on a background as neutral as possible.

As far as the quality of the inter-character relations is concerned, it can be determined also through the adaption of means utilized up to present, especially in sociometry. This will help to define the interpretation associated to the model of the text. Approaching the reality of the text from a new perspective — extra-literary — focused on the unity between model and interpretation, some of the results already obtained through the use of the mathematical linguistics can even be verified. It is obvious that the set C of the cardinal number N of characters is a model of a society and that, in its interior, actions are carried out manifesting the power of a character c_i on the others, or only on a part of them. Mario Bunge (1973) designates the power of an individual i in a group G of the cardinal number N ($\#G = N$) through the relation $\Pi(i) = N(i)/(N - 1)$ in which $N(i)$ is the number of individuals dominated by individual i from the range of the N members of the group. It is said that the power of i is strict if within the range of those he dominates, not one can be found who dominates him, and then $\Pi_*(i) = N_*(i)/(N - 1)$.

From the beginning, the question must be posed whether these values are significant or not. An initial doubt stems from an observation by Claude Berge (1967) according to whom the number of individuals dominated is not representative in itself as long as many individuals can be dominated but they are not influential, or few individuals but very influential. For instance, K dominates the whole figuration (up to hundreds of individuals), but his influence on the small group of main characters exercising the real power of decision in the play is practically nil. Therefore, the need arises to consider domination through third persons, a motive which leads to the introduction of the notion of the domination of an individual (by the group) and whose value is given by the relation $\Pi^{(-1)}(i) = N^{(-1)}(i)/(N - 1)$ in which $N^{(-1)}(i)$ is the number of individuals, part of the total number N, who dominate i. And in this case, the strict domination $^{(-1)}(i)$, a relation of the number of those who dominate i without being dominated by him, can be introduced.

	$\Pi(i)$	$\Pi_*(i)$	$\Pi^{(-1)}(i)$	γ
K	0.33	0.22	0.44	+0.17
Q	0.33	0.33	0.22	−0.05
P	0.22	0.22	0.11	−0.16
H	0.33	0.22	0.66	+0.39
G	0.22	0.22	0.11	−0.16
Ho	0.33	0.33	0.11	−0.16
L	0.33	0.22	0.22	−0.05
O	0	0	0.33	+0.06
Fg	0.33	0.22	0.22	−0.05

γ_i is the deviation from the average value

The calculations, whose results are reunited on the above table of powers and dominations, evidence the balanced nature of Polonius dominated and dominating at the same time, as well as the fact that K, H, and O are the dominated characters in the play, the rest being dominating. The matrix of dominations can also be given and interpreted as such. Its corresponding graph has as nucleus the subset {H, O}, a result which, reunited with the model of fuzzy exclusive equivalent classes, i.e. {H, Ho}, is an index of Hamlet's dual nature. Any character outside of this subset dominates one or the other or both characters. This element belongs to the set of interpretations and in particular pertains — just as the hierarchy, the indices of similarity and the fuzzy nuclei — to the obligatory elements; that is, no matter what section made through the interpretive (staging) option in the set I, it must comprise these elements in order that the interpretation be consistent.

A refinement of these results is possible through the consideration of two types of distances between two characters whose power, in respect to domination, has been determined:

(a) the α distance, associated to the power of character, i.e. $d(i, j) = |\Pi(i) - \Pi(j)|$;

(b) the β distance, associated to the domination of a character, i.e. $d^{(-1)}(i, j) = |\Pi^{(-1)}(i) - \Pi^{(-1)}(j)|$;

α and β distances are another type of indices of similarity (proximity), alignment around values evidencing the level of influence, respectively the level of domination. The corresponding matrices, after the operation of fuzzy sceprataion, are the following and the one shown on the next page.

	K	Q	H	Ho	L	Fg	P	G	O
K	0	0.33	0.33	0.33	0.33	0.33	0.22	0.22	0.11
Q	0.33	0	0.33	0.33	0.33	0.33	0.22	0.22	0.11
H	0.33	0.33	0	0.33	0.33	0.33	0.22	0.22	0.11
Ho	0.33	0.33	0.33	0	0.33	0.33	0.22	0.22	0.11
L	0.33	0.33	0.33	0.33	0	0.33	0.22	0.22	0.11
Fg	0.33	0.33	0.33	0.33	0.33	0	0.22	0.22	0.11
P	0.22	0.22	0.22	0.22	0.22	0.22	0	0.22	0.11
G	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0	0.11
O	0.11	0.11	0.11	0.11	0.11	0.11	0.22	0.22	0

The matrices can be reunited in a chart which gives evidence of power as well as of domination.

To the same problematic category also belongs the measure of heterogeneity, that is, of distribution over the set C of the characters of power and domination. The heterogeneity of power in set C is given by $D(\Pi) = (N - 1)^{-2} \Sigma_{i,j}^{N} |N(i) - N(j)|$. Basically, heterogeneity also gives a measure of the distance between individ-

	P	G	Ho	H	Q	L	Fg	O	K
P	0	0.55	0.55	0.55	0.44	0.44	0.44	0.33	0.33
G	0.55	0	0.55	0.55	0.44	0.44	0.44	0.33	0.33
Ho	0.55	0.55	0	0.55	0.44	0.44	0.44	0.33	0.33
H	0.55	0.55	0.55	0	0.44	0.44	0.44	0.33	0.33
Q	0.44	0.44	0.44	0.44	0	0.44	0.44	0.33	0.33
L	0.44	0.44	0.44	0.44	0.44	0	0.44	0.33	0.33
Fg	0.44	0.44	0.44	0.44	0.44	0.44	0	0.33	0.33
O	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0	0.33
K	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0

uals, which can easily be shown by making, in the given relation, several obvious substitutions:

$$D(\Pi) = (N-1)^{-1} \sum_{i,j}^{N} |\frac{N(i)}{N-1} - \frac{N(j)}{N-1}| = (N-1)^{-1} \sum_{i,j}^{N} |\Pi(i) - \Pi(j)|$$

$$= (N-1)^{-1} \sum_{i,j}^{N} d(i,j) .$$

In an analogous manner, the heterogeneity of domination is given through

$$D^{(-1)}(\Pi) = (N-1)^{-2} \sum_{i,j}^{N} |N^{(-1)}(i) - N^{(-1)}(j)|.$$

$D(\Pi) = 0.70$ is calculated and it corresponds to a quasi-uniform distribution of power in the set C of the play, as well as $D^{(-1)}(\Pi) = 1.60$, a value more than double, indicating the revelatory nature of the determination of the dominated subset. In fact, the two amounts tell us that:

(a) it is a question of strong natures, each of which exercises its power on the other;

(b) the domination is concentrated on one of the subsets, this concentration being a relevant aspect of any interpretation.

These conclusions deserve to be retained, inclusive in the exegesis of the play, while they contradict the affirmations of not only T.S. Eliot, Doyle, and even Granville Barker concerning the weakness of the characters and their lack of consistency. The interpretation associated to the model of the text must evidence, on the contrary, in which way the exercise of power takes place as well as the manner in which domination is constituted.

Claude Berge, whose results (Berge 1967) we shall mention, considers the relation between characters in a zero-sum game attributing to the matrix of domination the following values:

1. if the character c_i dominates character c_j, the value 2 in box a_{ij}, 0 in a_{ji}, that is, on the associated digraph, two arcs from c_i to c_j;

2. in the case of reciprocal domination, the value 1 in boxes a_{ij} and a_{ji} (that is, one arc from c_i to c_j and one from c_j to c_i);

3. in the case characters do not dominate one another, 0 in the corresponding boxes (no arc between them on the digraph).

It is a matter of iterated power, calculated up to a certain coefficient according to which the appropriate hierarchy is stabilized. The iterated power of the second order is the sum of the powers of the first order of the characters who dominate reciprocally and the double of the power of the same range of dominated characters in the same imagined zero-sum game. It can be demonstrated that

$$\lim_{k \to \infty} \Pi_k^i = \frac{\Pi_{(k)}^i}{\Pi_{(k)}^1 + \Pi_{(k)}^2 \dots + \Pi_{(k)}^n}$$

in which $\Pi^i(k)$ is the iterated power of order k of the character c_i. The Perron-Frobenius theorem shows that the limit always exists. The calculations are laborious but not impossible. They point out a hierarchy of the powers in which Ho occupies the first place, followed by G and Q. Due to the unexpected nature of this hierarchy, we decided to use one of Onicescu's (1970) procedures of estimation (comparative) of objects bearing several characteristics, and which is precisely the case of characters in a play. The order of the characters in set C is given by the decreasing series

$$S_j = \sum_{k=1}^{N} m_{kj} \frac{1}{2^k}, \quad j = 1, 2, \dots, N,$$

m_{kj} representing the number of times character c_j has occupied a place in the hierarchy from 1 to N, in connection to one of its characteristics (power, domination). We thus obtain:

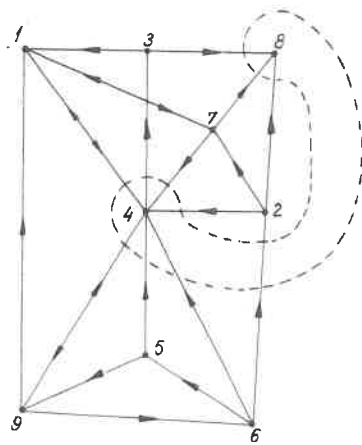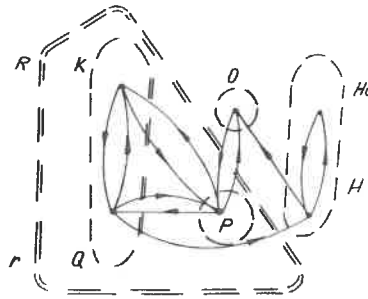|	Hierarchy after iteration:								Occupied position A × times:								
	1	2	3	4	5	6	7	8	I	II	III	IV	V	VI	VII	VIII	IX
K	3	3	3	3	4	4	5	6			4	2	1	1			
Q	1	4	5	4	5	6	6	5	1			2	3	1			
P	3	7	8	8	8	8	8	8			1				1	6	
H	3	5	4	2	7	5	4	4		1	1	3	2		1		
G	3	4	2	7	2	3	3	3		2	4	1			1		
Ho	1	1	7	5	1	1	2	1	5	1				1	1		
L	2	6	6	6	6	7	7	7		1				4	3		
O	4	8	9	9	9	9	9	9				1				1	6
Fg	2	2	1	1	3	2	1	2	3	4	1						

Fig. 7.

Fig. 8.

With the Onicescu values determined, a new hierarchy results: Ho, G, Q, K, H, L, P, O.

We pointed out the fact that the hierarchy established at the determining of the model of actemes (fig. 5) is not significant per se, but only in correlation to other parameters of the set of interpretation *I*. Comparing the two hierarchies (and even the three of them), one resulting from the matrices of presence/absence in the actemes and the other from the more detailed consideration of the characters' reciprocal relations (the third being that on the basis of the calculation of entropy), we observe that they intensionally dissimulate their extensional status. In other words, with the exception of L and O (as well as R+Gu and C+V), we are dealing with characters having a high degree of self-control and low spontaneity (even if in the dialogues H–P, H–Q or H–Os they sometimes seem to have a different appearance). Applying the same Onicescu procedure to the three hierarchies at our disposal, a regrouping results: Ho, G. H (of practically equal value), K, Q, P (the same), L, O.

We are consequently led to the very delicate problematic of the mobility of characters, that is, of considering them in dynamic evolution, therefore of their tendency towards approaching or distancing, of identification or disassociation. The passage from the condition of exercising power to that of object of domination are, in principle, the attribute of any character. The democracy of dramatic fiction reflects the strategy of all possibilities which, in theory, any play illustrates. This type of mobility is defined as perfect (precisely due to its equiprobable nature) or theoretical (as distinguished from net mobility). It can be calculated, also through a matricial procedure, and then compared to real mobility in order to obtain – again, and from another perspective – a measure of the play's deviation from the norm, therefore of originality and thus, an orientation point for any act of interpretation.

If $[M]$ is the matrix of interaction between characters, then matrix $[L]$, of the same dimensions and whose elements l_{ij} are given through $l_{ij} = n_{ij}M/n_i \times n_j$, is the

matrix of net domination (M, number of characters).

The value n_{ii} (on the diagonal) is called the coefficient of independence or, in the tradition of sociological terminology, of self-production (Bertaux 1969). The matrix is presented as follows:

	K	Q	P	H	G	Ho	L	O	Fg
K	0.99	0.74	0.74	0.99	0	0	1.23	0	0.74
Q	0	1.76	0	7.10	0	0	1.76	1.76	0
P	3.22	0.80	2.41	0	0	0	0.80	2.41	0
H	0.87	0.21	0.65	0.65	0.21	1.09	0	0.21	0.65
G	0	0	0	16.50	4.14	4.14	0	0	4.14
Ho	0	1.95	0	1.95	1.95	0	0	0	0
L	1.93	0	0	1.93	0	0	2.90	1.93	0
O	0	0	0	0	0	0	0	10.8	0
Fg	4.90	0	0	2.48	0	4.90	0	0	0

A few marginal observations: the maximum value (16.50) of influence is that of G on H. Keeping in mind the fact that the self-preserving value $l_{5,5}$ is small ($4.14 <$ 16.507) the productive nature of influence also results. Great influence is also exercised by Q and H (7.10), G on Ho (4.14), P on K (3.22). Obviously, the pairs must be taken into consideration: influence on c_i; influence from c_i. Recalling the discussion of the two established hierarchies and Ho's appearance in the position of leader, let us observe that the matrix of clearcut domination confirms the efficiency of the character (it should be noticed that the coefficient of self-preservation is nil). The idea of the transfer of domination is likewise evidenced: O is strongly influenced, L much less; Q is dominated by Ho who, however, transmits the influence (the actions in Act IV) of the others onto her (in order of size: 4.90). Finally, K is a dominated character and, in spite of appearances, quite uneffective even in relation to those whom he seems to dominate. On the basis of the matrix of clearcut domination, and esepcially by associating a Boolean matrix, we again construct a matrix of similarity as follows:

	K	Q	P	H	G	Ho	L	O	Fg
K	1	0.25	0.20	0	0.25	1.00	0.25	0	0.25
Q	0.25	1	0.40	0.25	0.20	0.20	0.50	0	0.20
P	0.20	0.40	1	0.20	0	0.20	0.40	0	0.16
H	0	0.25	0.20	1	0	0	0.20	0	0
G	0.25	0.20	0	0	1	0.20	0.20	0	0.50
Ho	1.00	0.20	0.20	0	0.20	1	0.25	0	0.20
L	0.25	0.50	0.40	0.20	0.20	0.25	1	0	0.50
O	0	0	0	0	0	0	0	1	0
Fg	0.25	0.20	0.16	0	0.50	0.20	0.50	0	1

The similarity between the characters Ho and K is significant, as we pointed out in the discussion regarding hierarchy, only from the perspective in which it was established (i.e. domination). And in this case, we can proceed to the confrontation between real values and those resulting from the calculation of a probabilistic type.

A concept corresponding to the nature of the drama and which is in close connection to the theory and practice of interpretation is that of *influence* (reuniting the exerciser power and domination). If the sequences (event-segment) in their succession are $s_1, s_2, ..., s_n$ and the probability of their appearance $p_1, p_2, ..., p_n$, with $\Sigma_{i=1}^{n} p_i = 1$, then the relation between the probability of apperance of an event and the influence of this is given by the measure $\mathcal{I}(p, i)$ which depends on influence as much as it does on probability. Understanding by events narrated situations as well as appearances or disappearances, within the given dramatic context, of some characters, we are directed to make use of the Shannon function (Shannon 1948) of the entropy, in which the influence factor intervenes:

$$H(p_1, p_2, ..., p_n)\, i_1, i_2, ..., i_n) = -a \sum_{i=1}^{n} i_i p_i \log p_i , \qquad \text{with } a > 0$$

an arbitrary constant.

Theatrical events, in the sense specified, do not have equal influence; moreover, they can exercise negative, nil or positive influence. The calculation of entropy extended to the level of the whole play is not relevant in itself; the same calculation permits us, however, to observe the strategy of the succession of the sequences and in particular the consecutive passage from relatively high values to smaller ones and again to high, in direct relation to the intuition of the psychological law of perceiving the theatrical act. The function of entropy in which influence, as a specific theatrical parameter, intervenes should be used in more refined determinations at the level of the actemes as well at the level of the whole play.

We have thus returned to the problematic of both the extensional and intensional aspects.

Model and interpretation

The reciprocal relation between the model and the interpretation should be extended from the level of the characters to that of the sequences (event-segments) in their succession from one act to the another, from one part (defined by the interpretation) to another. We can easily construct the matrix of inner connections (sequence within the context of an act, for instance) and outer connections (from one act to another). On the diagonal, values a_{ii} ($i = 1, 2, ..., n$), we again find the inner connections, the absolute value being and index of the complexity of the chosen succession of sequences. The value a_{ij} ($j \neq i, j = 1, 2, ..., n$) on the row corresponding to an act A_i (in this case $i = 1, 2, 3, 4, 5$) or to other groupings of

sequences corresponding to the option of the interpretation express the transfer of action from one act to another. The analysis of the dynamic processes again refers to the theory called the theory of perfect mobility, applied in this case to stage configurations. Evidently, at A of the connections between parts, if a_i is the sum of the values in row i and a_j the sum on the column j, we have:

$$\sum_{i=1}^{m} a_i = \sum_{j=1}^{m} a_j = M, \quad \text{as well as} \quad \sum_{i=1}^{m} a_{ij} = a_j \quad \text{and} \quad \sum_{j=1}^{m} a_{ji} = a_i$$

In the matrix of perfect mobility, an element f_{ij} at the intersection of row i and column j is given by $f_{ij} = (a_i \times a_j)/M$, that is, of the relation of the product of the sums on the row and given column, and the total sum on the matrices. This matrix represents the ideal model: an equiprobable passage from one part to another, and is constituted as an element of reference for the real matrix (the modifications concern only the values a_{ij}).

In the same manner, the matrix of net mobility can be utilized, with elements given through $g_{ij} = a_{ij}/f_{ij} = a_{ij}/(a_i \times a_j) \times M$. The values g_{ii} on the main diagonal indicate the degree of self-preservation of each of the parts, also pointing out their hierarchy. Moreover, the values g_i and g_j (sum on row i, column j), as well as $g_i - g_{ii}$ and $g_j - g_{jj}$ indicate the level of conditioning of the parts (acts) acquiring meaning, as has been seen, through comparison with the value of self-preservation $g_{ii}, g_{jj'}$. The difference $(g_i - g_{ii})$ indicates the value of the transfers from part A_i to the other parts. The difference $(g_j - g_{jj})$ indicates the level of conditioning of the parts of the act A_j by the other parts (acts). Very concisely, here are some of the possible consequences:

1. If $(g_i - g_{ii}) = 0$, the part (act) is conservative. If, moreover, condition $(g_j - g_{jj}) = 0$ for $j \neq i$, the segment is superfluous and can be eluded without affecting the consistency of the interpretation. For example: the sequence Polonius—Reynaldo.

2. If $(g_j - g_{jj}) = 0$, the part (act) is called absolutely generative stemming only from itself.

Calculations utilizing the sequential model and grouping in acts permitted the determination of the matrix of inner connections, perfect mobility and net mobility.

	1	2	3	4	5	a_i
1	19	3	2		1	25
2		3	3	2	1	9
3			5	6	2	13
4				9	5	14
5					13	13
a_j	19	6	10	17	22	74

	1	2	3	4	5	a_i
1	6.418	2.027	3.378	5.743	7.432	25
2	2.310	0.729	1.216	2.067	2.675	9
3	3.337	1.054	1.756	2.986	3.864	13
4	3.594	1.135	1.891	3.216	4.162	14
5	3.337	1.054	1.756	2.986	3.864	13
a_j	19	6	10	17	22	74

	1	2	3	4	5	a_i	$a_i - a_{ii}$
1	2.945	1.479	0.588		7.432	12.444	9.499
2		4.113	2.466	0.966	2.675	10.220	6.107
3			2.845	2.004	0.516	5.365	2.520
4				2.790	1.200	3.990	1.200
5					3.354	3.354	0
a_j	2.945	5.592	5.899	5.760	14.177	—	—
$a_j - a_{jj}$	0	1.479	3.054	2.970	10.823	—	—

Some conclusions of a preliminary nature:

— act I is faintly conservative, being the main generator of the final act ($2.945 < 7.433$). Acts III and IV participate with a relatively small ponderance in its generation.

— act II, balanced, faintly conservative ($4.113 < 6.107$) faintly conditions act IV.

— act III, self-preservative, play within a play ($2.845 > 2.520$) is symbiotically connected to act IV, participating in its conservative condition.

— act IV is highly conservative ($2.790 > 1.200$).

— act V, with a high degree of preservation (3.354) is mainly conditioned by act I and partially by act II ($a_{25} = 2.675$). Since $a_{25} < a_{55} < a_{15}$; it can be said that the complexity of act V is the consequence of the relation of transfer from act I and of the complexity of the events which take place in its duration. The graph reflecting the relationship between parts (fig. 4) has been submitted to an operation of reduction (fig. 9), the corresponding equation system having the form

$$x_2 = t_{12}x_1$$
$$x_3 = (t_{12} \cdot t_{23} + t_{13})x_1$$
$$x_4 = [t_{34}(t_{12} \cdot t_{23} + t_{13}) + t_{13}]x_1$$
$$x_5 = [t_{15} + t_{12}(t_{25} + t_{23} \cdot t_{35} + t_{23} \cdot t_{34} \cdot t_{45}) + t_{13}(t_{35} + t_{34} \cdot t_{45} + t_{45})]x_1 .$$
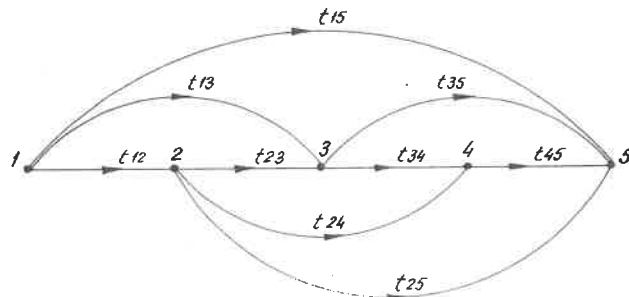
Fig. 9.

The final expression shows the dependence of the final act on the prior ones. A modality of calculating the transmittances is not yet at our disposal. There remains a suggestion of considering the relation between the number of inputs and outputs in a vertex of the digraph, an idea which has been used in several applications, making use of the theory of graphs.

But until then, the fact can be confirmed, through what has been established above, that *Hamlet* is the *tragedy of postponement,* the celebrated metaphor of "the mouse trap" also expressing this when the psychodrama set into motion by H and the Pl is so named. Returning, in order to close the analysis of the play from the perspective proposed (model and interpretation, or text and character, as we entitled this paper), to the reproach of T.S. Eliot concerning the formula of emotion, let us observe that this formula must be (so that the play cease to be considered "an artistic failure"), . . . "such tht when the external facts, which must terminate in sensory experience, are given, the emotion is immediately evoked." The play's finale is a polysensorial experience, postponed on the basis of an unusual strategy which causes that emotion not be evoked immediately so that it not be consumed just as immediately, but somehow late, in order that it *never* be consumed.

Summary

Regarding the theatrical play as a possible (and necessary) performance, it is shown that to every text can be attached a model (extensional aspect) and an interpretation (intensional aspect). The performance itself is considered as being simultaneously an act of communication and signification. Signification is brought about through the realization of the theatrical sign, therefore through the establishment of sense.

According to the premises set forth, and which stem from the consideration of the analogy between the play and a fuzzy abstract automaton, the model is subsequently determined in respect to actemes, the dramatic nucleii of the plot. The sequential progression has a configuration map attached to it in order to make a consistent development from the model to the interpretation possible. The characters' participation in an acteme is considered not only through their presence/absence (individuals, groups), but also from the perspective of their power (domination) in each sequence and in the whole. New parameters of similarity and new coefficients of

domination lead to a matrix of hierarchies (stablized after fuzzy separations), which belongs to the interpretation of the play. Its inner connections are revealed by the reciprocal relation Model—Interpretation.

Applied to Shakespeare's *Hamlet,* this theoretical approach reveals results significant for both the theory of drama and theatrical performance.

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