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Intolerance of Ambiguity : two Empirical Studies on the Generality Concept and their Heuristic Implications

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INTOLERANCE OF AMBIGUITY – TWO EMPIRICAL STUDIES ON THE GENERALITY CONCEPT AND THEIR HEURISTIC IMPLICATIONS

Else Frenkel-Brunswik was the first person who formulated the concept "intolerance of ambiguity" (AIT) in 1948. This took place against on the historical background of Second World War, of Nazism and Fascism, authoritarian, dogmatic and aggressive regimes, of racism and ethnic prejudice. Frenkel-Brunswik postulated the AIT-concept one year before she participated with Adorno, Levinson and Sanford in writing *The Authoritarian Personality.*

In both concepts it seems to me that the authors tried to cope with the historical circumstances by finding an unifying explanation for the disaster in basic psychological traits. This may have led to the exceptionally wide-ranging definition, Frenkel-Brunswik formulated for AIT as "K a tendency to resort on black-white solutions, to arrive at premature closure as to the evaluative aspects, often at the neglect of reality, and to seek for qualified and unambiguous overall acceptance and rejection of other people" (1949, p. 115).

The broad range of phenomena Frenkel-Brunswik tried to conceptualize includes nearly all levels and areas of psychological processing. This makes AIT not only a simple trait among others, but a sort of central or key or meta trait, which becomes more pregnant in the formulations of Bochner explicating Frenkel-Brunswik's definition (Bochner 1965, p. 393).

Unifying her empirical observations was the assumption that intolerance of ambiguity has generality, in at least two senses. First, it generalizes to the entire emotional and cognitive

functioning of the individual, characterizing his cognitive style, his belief and attitude systems, his interpersonal and social functioning, and his problem solving behavior. Second, intolerance of ambiguity generalizes to other sense modalities, in particular to the perceptual apparatus, so that the person intolerant of ambiguity in the emotional and cognitive sphere would exhibit similar characteristics in his perceptual behavior. Finally, Frenkel-Brunswik related intolerance of ambiguity to other personality variables, predicting a positive relationship with the authoritarian family of personality traits.

Only a quite small part of empirical research on AIT in the following five decades was devoted to this question of the overall concept. Kenny and Ginsberg (1958) seem to have been the first who tried to test empirically the generality of the concept. In an empiristical manner they intercorrelated 13 procedures by which AIT had been operationalized, ranging widely from AIT – and Authoritarian Submission Attitude scales over ratings of uncertainty, diverse tasks provoking decisions between discrepant vs. nondiscrepant trait-combinations and more or less provoking questions in indefinite and ambiguous tasks, up to the processing of perceptual tasks like reversal fluctuations or the Autokinetic Effect. Some of the measures were quite similar, like reversal fluctuations under three different instructions (passive, active, arrested).

From 78 calculated intercorrelations only 9 were significant ($p < .05$), only one of them higher than $r = .40$ and two of them not in the direction to be predicted from theory. Thus the results offered little support for a general construct of AIT.

From this the authors concluded that the concept should not be discarded, but is less general or broad in scope than had been initially assumed. ''Future research may discover a number of distinct or relative independent dimensions of intolerance of ambiguity rather than just one unique generalized factor'' (p. 304).

Before we come to look at such distinctions, let us follow the track of the generalized concept a little more in literature and afterwards in my own research. Bochner (1965) was one of the few investigators who reanimated the concept-question, trying to save the Frenkel-Brunswik concept. He criticized Kenny and Ginsberg's findings as in part attributable to methodological and psychometric shortcomings and proposed another more systematic way to test Frenkel-Brunswik's position.

First he organized the implications she had drawn into a set of defining characteristics for the AIT concept. ''Primary characteristics: intolerance of ambiguity is characterized by (a) rigid dichotomizing into fixed categories – ''need for categorization''; (b) seeking for certainty and avoiding ambiguity – ''need for certainty''; (c) inability to allow for the co-existence of positive and negative feature in the same object, e.g. ''good'' and ''bad'' traits in the same person; (d) acceptance of attitude statements representing a rigid

Interrelations among Measures of Intolerance of Ambiguity

Test Measures	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Passive, Reversals	–	.34**	.31**	–.08	–.11	–.02	–.12	–.05	.22*	–.15	.13	–.01	.01
2 Acitive, Reversals		–	.14	.00	–.17	–.03	–.06	–.03	–.18	–.19	.01	–.08	.07
3 Arrested, Reversals			–	.08	.01	.02	.06	–.16	–.17	.05	–.01	.06	.20
4 Walk's A Scale				–	.06	–.09	.32	.01	–.02	–.19	–.10	–.11	.57**
5 Trait Discrepancy					–	.17	.07	.16	–.01	.02	.06	–.08	.07
6 Kind of Person						–	.19	.01	.01	–.08	–.03	–.07	.03
7 Blocks							–	.38**	.07	.02	.04	–.09	.07
8 Total Questions								–	–.20	–.01	.00	–.24*	.25**
9 Discrepancy, Autokinetic									–	.05	–.18	–.03	–.03
10 Consistency, Autokinetic										–	.17	.03	.14
11 Confidence, Autokinetic											–	–.26*	–.01
12 Undecided Answers												–	.17
13 Authoritarian Submission													–

* $p < .05$, two-tailed test; ** $p <$ 01, two-tailed test (Kenny, Ginsberg 1958, p. 303).

white-black view of life; (e) a preference for the familiar over the unfamiliar; (f) a positive rejecting of the different or unusual; (g) resistance to reversal of apparent fluctuating stimuli; (h) the early selection and maintenance of one solution in a perceptually ambiguous situation; (i) premature closure.

Secondary characteristics: persons intolerant of ambiguity will be (a) authoritarian; (b) dogmatic; (c) rigid; (d) closed minded; (e) ethnically prejudiced; (f) uncreative; (g) anxious; (h) extrapunitive; (i) aggressive" (p. 394).

Then, with examples from two studies by Hamilton (1957) and by Draguns and Multary (1961) he criticized "logical errors" in the test construction: Different parts of the theory make contradicting predictions and all of these parts are implied in the tasks the investigators used. For instance "need for categorization" (primary characteristic "a") and other ("h" and "i") predict in the case of ambiguous drawings that AIT leads for fewer answers in a "cannot say" response category, while "need for certainty" ("b") predicts precisely the opposite.

Therefore, in a third step Bochner constructed two tasks, each isolating only two attributes of AIT:

Need for categorization
Need for certainty

67 Ss had to classify little rocks of different colours, textures *etc.* and as a second task pictures of persons differing in age, sex etc. Dependent variables representing the two aspects of AIT were:

– the number of categories as indicator for "need of categorization";
– the time taken for each test as measure for "need for certainty".

Results: The time needed to sort each series is related to the number of categories made (.59 and .45).

Bochner discussed these results under the assumption that the two subdimensions are related positively: The person who has a need for categorization will also seek certainty. It seems to me that there are some problems in Bochner's manner of proceeding and his argumentation:

1) He does not criticize Frenkel-Brunswik's theory for implying contradicting predictions for different characteristics of AIT but only sees the fault in multivalent tasks.

2) His proceeding would be only the beginning of a vast series of investigations necessary to test all "characteristics" of AIT in all combinations.

3) The most important problem seems to me that of the artifact, when the same tasks are used to deduce different indicators from them for different aspects of AIT. He himself mentions this problem: "It is clear that part of the correlation between the number of categories and the time taken to sort them can be accounted for by the fact that larger sorts tend to take longer" (p. 399).

Because of these problems I decided to approach the question of concept neither in the empiristical manner of Kenny and Ginsberg nor in Bochner's risky way with more systematic but maybe confounded measures. Instead I have preferred to contrast the whole bunch of "primary characteristics", which is implied in the most common instruments for measuring AIT, namely questionnaires, on one hand with two precisely defined and homogeneous characteristics on the other hand, in Bochner's terms "resistance to reversal of appearant fluctuating stimuli" ("g") and "the early selection and maintenance of one solution in a perceptually ambiguous situation" ("h") to test the generality and broadness of the concept once again. These are, similar to those of Kenny and Ginsberg (1958), but only the perceptual sectors of their instruments, which in our case are analyzed, in detail with several reversible figures and an ambiguous one and with two quite different AIT-questionnaire instruments additionally.

So in terms of Bochner's systematization one well circumscribed area consisting of two primary characteristics of AIT is contrasted with the broad variety of other factors implied in the AIT questionnaires.

One might argue, that this is not a fair test for the generalization postulate, because fluctuation of ambiguous figures seems to lie rather in the periphery of the AIT-concept than in the center.

But let us remember:

1) Frenkel-Brunswik (1949) titled her article conceptualizing AIT "Intolerance of Ambiguity as an Emotional and Perceptual Personality Variable". Under the subtitle "Experiments on Perceptual Ambiguity" we find the explicit statement "These are [...] designed to help to investigate whether or not such characteristics as intolerance of ambiguities are generalized" (p. 126).

2) They are explicitly named in Bochner's systematization of Frenkel-Brunswik's definition as "g" and "h" of 9 primary characteristics.

3) In the Frenkel-Brunswik tradition of the AIT concept, the factors are not weighted for their centrality. AIT is rather a universal and homogeneous "mechanism" spred over nearly all areas and functions of psychological processing.

4) The choice of reversals as an operationalization of AIT is partly comparable with Kenny and Ginsberg's and additionally allows one to look for the effects of instruction.

5) There is at least one investigation which used fluctuations successfully.

In a connected area of research, Jones (1955) found, with two groups of 251 and 122 Naval Aviation Cadets as Ss, significant rank correlations of −.22 and −.25 between a slightly modified F-Scale and the number of reversals experienced in the Necker Cube (ambiguous figure), but only if the Ss were instructed to try to make the cube fluctuate. For the Ss

instructed not to allow reversals the correlation was −.03. Put in the words of the author: ''[...] when Ss are set toward reversal, the authoritarian continues to experience a low rate of fluctuation while the nonauthoritarian experiences a high rate of fluctuation. The result is a negative correlation between authoritarianism and rate of fluctuation'' (p. 126).

Authoritarianism certainly is not the same as AIT. But there is some research indicating connections between these variables (e.g. Budner 1962, Sidanius 1978, Schneider *et al.* 1993). Some more remarks on argument 5) and the corresponding area of AIT research: From the beginning up till now much research was done on what Bochner calls ''secondary characteristics'' of AIT, especially on connections with the field of the authoritarian personality, some of which were mentioned above. This research was accompanied by the development of many questionnaire instruments and mostly consists of correlational studies, especially factor analyses.

Among the many questionnaire instruments measuring AIT (e.g. Budner 1962, MacDonald 1970, Norton 1975) there are the two German ones which we have used in our own studies. The ''16 Fragen zur Messung der Ambiguitätsintoleranz'' (AIT-16 by Zinke and Lauterbach 1988) is a global questionnaire consisting of 16 items. They deal with preferred control over working conditions and social conditions which mostly belong to Bochner's primary characteristics ''a'' and ''b''. One question refers to the characteristics ''c'' or ''d''.

It was in the line with the change in our heuristic orientation (see below) that in 1996 a quite different instrument was compiled in German, the ''Inventar zur Messung der Ambiguitätstoleranz'' (IMA, by Reis). The IMA consists of 40 items sorted into 5 subscales, which no more seem to be oriented so much to primary characteristics of AIT but to quite concrete, mostly social topics and areas of experience, like social conflicts, sex role stereotypes and images of the parents.

Before this only Norton (1975) had proceeded with his questionnaire from a one-dimensional concept of AIT to the differentiation between 8 areas of AIT, like public image, social, job-related, art form *etc.* The 52 items on the total scale had a reliability of .88 (KR-20-formula), but the correlation with the Budner scale was only .40. Validations exist only for the total scale and referred to the question of taking part in an unspecified psychological experiment and on indices of behavior collected with Bales' interaction categories.

Even though Bochner's characteristics will lastly stem from experience too, they are much more abstract and general (e.g. need for categorization and certainty, white-black view of life, premature closure). They focus on topic-independent general modes of psychological processing and do not differentiate between concrete areas of experience which may differ within

the "primary characteristics", which are a priori categories and not empirically derived. A new sort of AIT instruments like the IMA opens possibilities and makes sense for intercultural or cross-national comparisons in which AIT may help us to understand better the subjective consequences and representations it has when people are socialized and educated in a partly different manner.

But first to our research concerning the concept question: Two investigations were conducted with the general question: "Are specified "primary characteristics" in the sensory area, namely "g) resistance to reversal of apparent fluctuating stimuli" and "h) the early selection and maintenance of one solution in a perceptually ambiguous situation" (see p. 4) interrelated with each other and with a whole collection of other "primary characteristics" represented in AIT questionnaires?"

EXPERIMENT 1

METHOD

Design
40 Ss were randomly assigned to two groups of 20 Ss which processed the figures under the instructions "passive" or "arrested". For half of each group the figures were presented in a different order to test for effects of sequence.

Participants
Ss were students of Psychology at the Justus-Liebig-Universität in Giessen, Germany, aging between 19 and 32 with a mean of 24 years; 25 of them were female.

Materials and procedure
Reversible figures: 9 reversible figures were taken from an investigation by Hartmann (1961). A priori and along with classifications by the authors it is postulated phenomenologically that 3 of them have a concrete content which has social-emotional relevance that changes with the fluctuations: two faces as silhouettes in black or white, which apparently have differing expressions; an old vs. a young woman (after Hartmann 1961, p. 32 also called "my wife and my mother in law"); duck vs. hare.

6 figures are of quite formal, geometrical and abstract character, even if you may see in them "stairs", "3 cubes", "6 or 7 cubes", "bars" or a "block". Purely abstract is "relief".

One additional picture from Escher show swans flying over a landscape, white ones from left to right and alternately black ones from right to left. This is appearantly an ambiguous picture, representing the primary characteristic h), but not a reversible figure because you can see both versions of it at the same time, which should not be possible according to modern psychophysiological theories of reversal processing. (Our data will confirm this).

Ambiguity Intolerance Questionnaire AIT-16 by Zinke and Lauterbach (1988): the questionnaire is a modification of Kischkel's AIT-14 (1984), which itself consisted of translated items from the MacDonald Scale (1970) and the Norton Scale (1975). 8 questions were simplified in formulation, 2 were added. An internal consistency of .8 (Cronbach's alpha) is reported for 408 women and men, students of Arts, soldiers and pregnant/nonpregnant women.

In addition to previous results (see Kischkel 1984), the validity of the construct and the test AIT-16 is supported by different scores for professional soldiers and students of art, and by the fact that AIT moderates the correlation between intra-personal conflict (Lauterbach 1987) and negative mood: the correlation is high only in subjects intolerant of ambiguity. As discussed above this instrument seems to include a broad range of the "primary characteristics" Bochner has formulated, possibly all of them from "a" to "e".

The experiment was scheduled with individual persons each performing the reversal tasks first, then the AIT-16 and last answering some control questions about having been obedient to the instruction, about certainty of fluctuations, interest in the experiment, prior knowledge of the figures and private hypothesis about the aims of the experiment. At the end the coverstory (sex differences in perception) was revealed.

The reversible figures were presented as black-white photographs of 13 x 18 cm at the same short distance for all Ss. The fluctuations over one minute after the first one were registered by a special computer program measuring the times which the Ss needed to serve a key on the computer keyboard when they experienced a reversal.

Hypotheses and variables

1. The main hypothesis was that there are mean or high intercorrelations between AIT-16 scores and reported fluctuation frequencies for the reversible figures as well as the ambiguous figure.

2.1. According to from Bochner's systematization of the Frenkel-Brunswik generality postulate, there should be no differences in the intercorrelations with the AIT-16 between the two kinds of reversible figures, with or without social-emotional content.

2.2. A weaker version of the generality postulate following Kenny and Ginsberg's proposition of relatively independent dimensions predicts higher correlations of the AIT-16 scores with the social-emotionally relevant "content pictures" than with the "formal" ones, because apparently they have more similarity, more elements or "primary characteristics" in common with the questions of the AIT-16.

An additional test of the strong generality hypothesis as well as the weaker one is the appearantly nonreversible but ambiguous picture "swans" by Escher.

3.1. According to the strong version it is predicted that this picture correlates with the reversible figures and with the AIT-16 to about the same degree.

3.2. According to the weak version, higher intercorrelations with the reversible figures are predicted than with the AIT scores, because the ambiguous picture "swans" as well as the reversible figures belong to the area of perceptual ambiguity and insofar have more similarity with each other in processing or function than with the AIT-16 questions representing other "primary characteristics".

4. It is difficult to predict the influence of the two sets of instructions on the intercorrelations. Kenny and Ginsberg (1952) found no differences. A predictable larger variance under the instruction "passive set" may result in higher intercorrelations, but maybe this is not indicated by the usual correlation coefficients because of nonlinear relations.

5. An analysis of the dimensions of reversible figures alone should show differences between the "content" and "formal" figures and should separate the ambiguous but nonreversible picture "swans" (Escher) from all the others.

RESULTS

The control variables and the more detailed information about distances between fluctuations were omitted from the analysis because obviously there seemed to be no system to be found in them. No effect of presentation sequence was found either.

1. Properties of the instruments

The psychometric properties of the AIT-16 are mentioned below (see p. 20). For the reversible figures and the ambiguous figure intercorrelations were calculated, a multidimensional scaling (Euklidian Distance Model) and an item analysis was performed as well as a treatment check for the effect of instruction.

Intercorrelations of the pictures under the instruction ''passive'' (in heavy type correlations significant on the $\alpha = .05$ level)

	2 faces	Swans	Bars	Duck/hare	3 cubes	Old/young woman	Relief	Block	6/7 cubes	Stairs
Swans	.2664	–								
Bars	.6144	–.1463	–							
Duck/hare	.8525	.2646	.6609	–						
3 cubes	.4109	–.0889	.4028	.2801	–					
Old/young women	.7032	.2199	.5410	.6551	.4267	–				
Relief	.6095	–.1525	.5181	.5617	.7008	.6026	–			
Block	.5417	.3673	.2673	.4012	.5465	.7367	.5357	–		
6/7 cubes	.6703	.4311	.3837	.5038	.7695	.5009	.5769	.6869	–	
Stairs	.5527	–.1584	.6712	.5569	.4520	.7088	.7186	.5685	.3152	–

Intercorrelations of the pictures under the instruction ''arrested'' (in heavy type correlations significant on the $\alpha = .05$ level)

	2 faces	Swans	Bars	Duck/hare	3 cubes	Old/young woman	Relief	Block	6/7 cubes	Stairs
Swans	.6370	–								
Bars	.5067	.3116	–							
Duck/hare	.7101	.8944	.3396	–						
3 cubes	.4780	.5384	.5064	.7180	–					
Old/young women	.7693	.4912	.6488	.5109	.2673	–				
Relief	.2028	.2807	.5479	.2095	.0946	.2617	–			
Block	.3394	.0895	.7914	.1856	.4040	.5327	.3978	–		
6/7 cubes	.4359	.6109	.6281	.6594	.8085	.2785	.2964	.3750	–	
Stairs	.3189	.1480	.7008	.2169	.4431	.3841	.1484	.6978	.4936	–

Intercorrelations of the figures

Under the instruction ''passive'' 29 of 45 intercorrelations were significant, ranging in size from .42 up to .85. The index of homogeneity is $r_i = .47$. Only the picture ''swans'' had no significant intercorrelation with any other figure.

Under the instruction ''arrested'' 23 of 45 intercorrelations, now different in part, were significant and ranged between .44 and .76. The index of homogeneity is $r_i = .45$. In this experimental condition the picture ''swans'' correlates quite high (between .49 and .89) with 5 of the 9 other figures, while the figure ''relief'' has only one significant intercorrelation.

From these results we can conclude, that

1. The reversible figures are moderately homogeneous.
2. In detail this depends on the instruction ''passive'' vs. ''arrested'', especially for the picture and ''swans''/''relief'', for which intercorrelations are minimized/maximized under the latter.
3. The correspondence or homogeneity of the ambiguous picture ''swans'' with the reversible figures is totally instruction-dependent. So it seems to be the instruction that produces fluctuations rather than the character of the picture itself.

Multidimensional scaling of the figures

A multidimensional scaling basing on the Euklidean distance measure uses intercorrelations as a measure of similarities and shows their dimensionality in a graphic way. Data are represented quite well by two dimensions as can be seen by a stress value of .0305. Representation of data on three instead of two dimensions does not reduce the stress value essentially to .0295.

Calculations with the whole sample were necessary on one hand because of the small N. On the other hand it is problematic to put the two subsamples with different instructions (and effects on the correlations) together.

Keeping this problem in mind, the 2-dimensional solution clearly shows a separation of the ambiguous picture ''swans'' (in Quadrant 2) from all reversible figures. And it shows a separation too of the social-emotional relevant ''contentful'' pictures ''duck/hare'', ''old/young woman'' and ''2 faces'' (in Quadrant 4) from the 6 figures which are rather abstract and formal, most of them being geometrical.

This corresponds to our a priori classifications along Bochners' ''primary characteristics'' of AIT and to Hartmanns' categories for reversible figures. Because of the above-mentioned problem of mixed subsamples intercorrelations between six reversible figures were calculated in another study (see Study 2), in which the three ''contentful'' pictures and three of the ''abstract'' ones were used. The results relevant in this context quite clearly confirm those of Experiment 1.
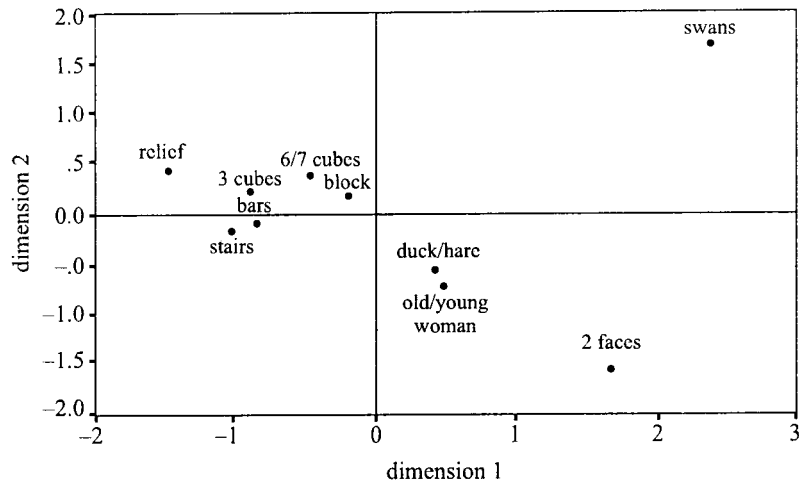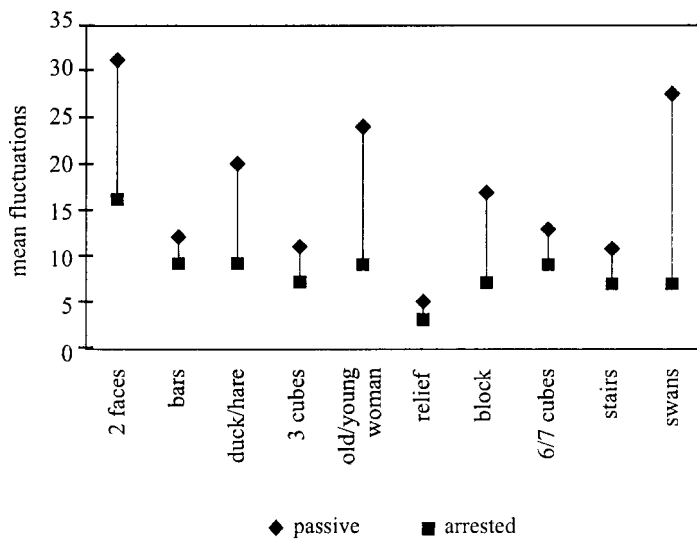
Fig. 1

Fig. 2

With one exception ("block", a reversible figure which intercorrelated mostly low and significantly with all others) there are clearly two bunches of intercorrelations: those between the "contentful" pictures "2 faces", "duck/hare", "old/young woman" are quite high (r ranges from .539 to .652) and significant at the level of $\alpha = .05$ and those between the

''formal'' figures, which are not so high (*r* ranges from .407 to .502) but all significant too. Other (mixed) combinations are not significant and near zero.

Intercorrelations of the six reversible figures in Experiment 2

	1	2	3	4	5	6
1 3 cubes	–	.5020	.4804	.2912	.1303	2447
2 Stairs		–	.4072	–.0845	.0826	.0226
3 Block			–	.3943	.5189	.3739
4 Duck/hare				–	.6520	.5391
5 Old/young woman					–	.62.55
6 2 faces						–

Treatment check

Differences in mean fluctuation frequencies are significant on the (α = .05 level in 7 of 10 cases (one-sided Welsh test for independent samples). 4 of the 5 by far largest differences appear in the three ''contentful'' reversible figures and in the ambiguous picture ''swan''. Thus the instruction has been as effective as it should be, but not to the same degree for all pictures.

Means and standard deviations of the fluctuation

	Passive		Arrested		
	M	SD	M	SD	
2 faces	31.11	20.50	16.15	9.98	
Bars	11.75	6.05	8.80	5.48	
Duck/hare	20.00	15.15	8.30	5.57	
3 cubes	11.20	9.50	7.15	3.33	
Old/young woman	23.50	17.02	8.60	5.28	
Relief	5.00	6.51	2.79	2.62	
Block	17.15	11.51	6.85	5.18	
6/7 cubes	13.20	7.19	8.80	9.10	
Stairs	10.85	8.66	6.85	6.05	
Swans	28.11	28.15	7.44	6.56	

Significant differences between the means are marked by bold type (one sided Welch test for independent samples; α ∴ .05)

Item analysis

With an N of only 19, an item analysis (for the passive set) resulted in a reliability coefficient of .888 (Cronbachs' alpha), the standardized item alpha was .914. Corrected item-total correlations ranged from .55 to .83.

T a b l e 6

Corrected item-total correlations

Pictures	Corrected item-total correlations
2 faces	.8305
Bars	.6228
Duck/hare	.7245
6/7 cubes	.5506
Old/young woman	.7847
Relief	.7442
Block	.6631
3 cubes	.6816
Stairs	.7081

2. Main results

Intercorrelations between the AIT-16 and the reported fluctuations are only significant in one of the 20 cases (10 figures, 2 instructions). 16 of them range from .20 to −.20. Only 3 intercorrelations are higher than .33. All of them concern the social-emotionally relevant ''contentful'' pictures and only appear under the instructional condition ''arrested''. In contrast, under the natural instruction ''passive'' they are near to zero.

From this, two conclusions can be drawn:

1) Experimental treatments like instruction may produce phenomena which are related to AIT defined by questionnaire instruments rather than the reversible or ambiguous figures themselves. The mechanisms for this are certainly complex and not strictly derivable from our data.

2) They seem to have something to do with the categories of reversible figures, two of which have been identified and confirmed in our study as social-emotional relevant ''contentful'' pictures, as opposed to abstract and formal geometric ones.

The contents or topics of those pictures seem to have elements in common with the topics of the questionnaire, e.g. content per se and social-emotional valence. In order to be sure that the negative results are not the result of shortcomings of the instrument, we once again tested the psychometric properties of the AIT-16.

In a sample of 98 teacher students (69 female, 25 male and 4 without declaration of sex) Cronbachs' alpha was only about .6 for the whole sample as well as for the two sexes. Only about one third of the corrected item-total-correlations were higher than .3. Thus the properties by Zinke and Lauterbach (1988) could not be reproduced, namely Cronbachs' alpha = .8; median of r_{it} = .41. Maybe the poor psychometric properties we found result in part from the fact that our sample was more homogeneous than that of Zinke and Lauterbach (1988).

Intercorrelation between fluctuations of the 10 pictures and the AIT-16 scores under the instruction ''passive'' and ''arrested''

	2 faces	Swans	Bars	Duck/ hare	3 cubes	Old/young woman	Relief	Block	6/7 cubes	Stairs
''passive'' AIT-16	.0693	.0775	−.0972	−.0907	−.1267	−.0410	−.2704	.1248	−.0224	.0758
''arrested'' AIT-16	.3872	.0821	.1132	.3395	.0135	.3731	−.1703	.1196	−.1027	.2249

In part it may be due to the conditions under which we worked: In 3 seminars the questionnaire was answered at the end of a lesson, so that many of the students seemed to be in a hurry to finish. This was the reason why we performed the AIT-16 in 6 other seminars with 275 teachers students (62 male and 226 female) in the middle of a lesson, together with another longer questionnaire consisting of 40 items (the IMA, see below), so that the situation probably was more calm and more extensive and intensive. This time Cronbachs' alpha was .75 (standardized: .76) and item-total correlation ranged from .17 to .49, mostly about .3 and .4.

Remaining doubts in the psychometric properties of the questionnaire and even more in its character as a short and global instrument led us to test our hypothesis once again with another one, the newer *Inventar zur Messung von Ambiguitätsintoleranz* (Reis 1996). It correlates in its total score with the AIT-16 $r = .76$, but has 5 different subscales. They were constructed systematically on the basis of factor analyses.

STUDY 2

METHOD

Design
In a correlational study Ss responded to several reversible pictures, the AIT questionnaire IMA and some control questions. Order of presentation of the pictures was not varied because in Experiment 1 no effects of sequence had been found.

Participants
Most of the 30 Ss were students of Psychology at the University of Giessen some additional ones recruited from the private sphere of the experimenter. They aged between 17 and 67 years, in the mean 27.5 with a standard deviation of 11.7 years. 12 of them were male.

Materials and procedure
6 of the 9 reversible pictures from Experiment 1 were used again, the three "contentful" ones "duck/hare", "old/young woman" and "2 faces" and three of the "formal geometrical", "3 cubes", "stairs" and "bloc", which had corrected item-total correlations of .68, .70 and .66 and significant intercorrelations between .45 and .56 (see Tab. 8 and 6).

In the second study, instead of the AIT-16 the *Inventar zur Messung von Ambiguitätsintoleranz* (IMA) (Reis 1996) was used as a questionnaire instrument. It consists of 40 items. 24 of them were formulated positively

toward tolerance of ambiguity and 16 were inverted. They are differentiated into 5 subscales:

PR means AT for seemingly unsolvable problems,
SK means AT for social conflicts,
EB means AT of the image of the parents,
RS means AT for role stereotypes,
OE means AT for new experiences.

Reliabilities for the subscales and total scale are sufficiently high, between .7 and .9, most of them higher than .8. Stabilities (retest after 4 weeks) are between .83 and .97, most of them about .9. Corrected item-total correlations are all higher than .4, item difficulties between $p=.30$ and .80. All items have been newly created, without copying older ones from other questionnaires. The scales have been constructed in several steps by factor analyses. The procedure of Study 2 was the same as that of Experiment 1.

Hypotheses

These are the same as in Experiment 1 except for 3.1. and 3.2., because the picture "swans" was not included.

RESULTS

1. Instruments

The intercorrelations between the 6 reversible figures have been reported and discussed above. Corrected item-total correlations were calculated again and are high except for "stairs". Maybe this is an effect of asymmetric and bi- or multimodal distributions, especially for "stairs", and for "block". This will make correlations with the IMA less probable.

Table 8

Descriptive statistics and corrected item-total correlations for the fluctuations of the 6 reversible figures

	"3 cubes"	"stairs"	"block"	"duck/hare"	"old/young woman"	"2 faces"
M	13.17	15.63	16.7	25.47	27.07	40.63
Median	13.00	14.00	15.00	22.00	24.50	39.00
SD	7.39	10.88	12.29	12.11	18.52	18.23
Min.–Max.	0–37	0–41	0–43	0–55	0–71	3–83
r	0.42	0.18	0.62	0.59	0.67	0.58

2. Results referring to the hypotheses

There are only few significant correlations between the reversible figures and the IMA subscales and total scale. Thus from a total of 36 intercorrelations between the 6 figures and the 5 subtests plus total score of the IMA only 4 are significant. And from these only 1 makes sense in the light of the discussion in Experiment 1.

So it must be assumed that once again, according to Kenny and Ginsberg and to our own Experiments 1 and 2 there is no substantial indication of either the unifying concept or even of a multiple factors hypothesis for AIT. And this conclusion is quite independent of different strategies and instruments in the three studies.

DISCUSSION

The 9 reversible pictures in Experiment 1 represent a really good test with high item-total intercorrelations and internal consistency (.888). But what do their fluctuations measure beyond reported fluctuations? One may label it AIT or AT. But this AIT has almost nothing to do with what is covered by questionnaire instruments constructed for measuring AIT, like the AIT-16 or the IMA.

Only one of 20 intercorrelations (for two instructions) in Experiment 1 and only 4 of 36 intercorrelations in Study 2 are significant and at best moderately high. And the glimpse of a plausible systematic in Experiment 1, indicating common topical elements to be a heuristic trace of the correlations between fluctuations and AIT-16 scores was totally dependent on the instruction and not confirmed in Study 2.

Furthermore, no correlation was found between the seemingly similar reversible and ambiguous figures (Bochners' primary characteristics "g" and "h"): the insignificant and mostly minimal correlations between the ambiguous "swans" and the reversible pictures under the "passive" (natural) instruction set enhanced under the instruction "arrested", but this too seems to be an effect of instructional condition rather then one of reversibility material itself.

For all these data and reasons the uniform concept of AIT should be discarded now as it seems to be no longer salvageable by blaming methodological shortcomings, as Bochner (1965) argued after Kenny and Ginsberg's (1958) findings. Even a weaker, multiple factors concept would demand pervading middle high correlations between the different areas

or characteristics of AIT quite independent of experimental conditions. This too was not verified by our data.

At this point of research, more than 50 years after its beginning, a sort of circle seems to be closing with regard to the correspondence between the historical situation and the heuristical strategy in AIT research: a strategy of seeking conceptual unification, as a key trait, "a topic to serve as a medium", "one of the basic variables in the emotional and cognitive (and perceptual, the author) orientations of a person towards life [...]" (Frenkel-Brunswik 1949, p. 113) no longer seems to be fruitful. Instead, a broad range of diversifications between areas and topics of AIT as a source for better understanding of how circumstances (intercultural, cross-national, subcultural and so on) leave their traces in the mind, how different conditions generate different subjective representations of ambiguities and their tolerances has to be investigated.

Not only research in this area seems to be changing, but the world too: Rapidly increasing intercultural contacts with innovative media like the Internet, economic and political changes like the European unification, like globalization, like worldwide migration, demand psychological attention and research, the focus of which lies on diversification in identifying obstacles and in finding tools for coping with the future demands.

For instance, Poland and Germany, where our research on AIT has just begun, are European neighbors with many historical and cultural aspects in common, but at the same time they apparently differ in 40 years of orientation and organization of society, in hundreds of years of religious orientation, for instance. And again they now have in common a radically and very fast changing future of a European and global dimension.

Against backgrounds like these I propose reserving the term AIT or AT for the "specific emotional-cognitive modality of information processing" with the reference point on "phenomena of pleasure-unpleasure" (Reis 1996, p. 7) on the basis of Norton's (1975, p. 608) definition, derived from a content analysis of all relevant literature at that point of time: "Intolerance of ambiguity is a tendency to perceive or interpret information marked by vague, incomplete, fragmented, multiple, probable, unstructured, uncertain, inconsistent, contrary, contradictory, or unclear meanings as actual or potential sources of psychological discomfort or threat".

It should be completed by Budners' (1962) and MacDonalds' (1970) enhancement of the definition: they postulated an explicit need or active endeavour on the pleasure side in addition to the passive tolerance, so that a bipolar dimension arises. And I would like to add, too, that instruments for measuring AIT/AT should be limited to those which allow and make sure that the emotional component is involved and, more than that, aspects and topics of real life are included, where ambiguities really arise and

tolerance/intolerance is really part of the subjects' answer to the topic and situation. At seems that this would be better accomplished by questionnaire instruments than by experimental tasks like categorizing objects or reporting the fluctuations of ambiguous figures, which don't have emotional implications at all or the implications of which are to be inferred at the level of speculation. Frenkel-Brunswik already mentioned, under the heading ''Experiments on Perceptual Ambiguity'', ''These are quite free from emotional and social content [...]'' (1949, p. 126).

This will probably be decisive for possible conflicts, their perception and possibilities for their solution or limitation. A glimpse of these aspects and heuristic perspectives maybe caught in an investigation of Hoyer, Frank and Lauterbach (1994) in the field of clinical psychology. The authors found that AIT may be an additional factor of risk in coping with conflicts or conversely that ambiguity tolerance can help to reduce the perception and consequences of conflict.

At this point I would like to make one more reflection about the concept-question. Was it worth while to test it once again? What are the strategic heuristical consequences of knowing that a one factor or multiple factor concept of AIT does not seem to be justified? What difference does it make for our cross-national comparison? Couldn't we have done this without the detour over the concept question?

Of course we could have, in a naive way, but now:

1. no future research on a concept question of this type seems to be necessary and fruitful yet. And more important is that the Frenkel-Brunswik tradition, operative but unreflected in many publications, now has the chance to go through an explicit change.

2. It now seems to be more important than before, which specific instruments we use. In the Frenkel-Brunswik tradition under the generality postulate this was often done arbitrarily or only under formal aspects of psychometric properties or practicability. Under the generality concept each operationalization, especially each item of content should have been more or less the same. Now we cannot only drop experimental techniques like reversible or ambiguous figures, like numbers of any categories used and time spent for categorizing, like numbers of any questions asked, no matter what categories or what questions. We should not only use questionnaires instead, that ask for seemingly universal content. But we will have to formulate carefully questions which really touch the relevant properties of the Ss we select and the scientific topic and question we are dealing with.

3. Now it is no longer a question of applying seemingly ''general'' AIT instruments to practical questions. But it will become the essence of AIT to diversify Ss, situations and topics instead of looking for ''primary

characteristics'', sketching the whole body of possible AIT. In principle there is an infinite number of topics from which, under circumstances to be specified, ambiguities can emerge and to which tolerances/intolerances can be the responses.

4. Put in terms of Psychodiagnostics, this resembles what in German Pedagogical Psychology is called ''Förderdiagnostic'' (This is a kind of direct diagnostic with specific interventional consequences). Its procedure is – in contrast to conventional indirect diagnostic – to construct and validate empirically a hierarchy of developmental or functional or object-inherent steps and levels and look for items that measure the concrete point of mastery an individual has attained, in order to support him in the steps following next.

In our corresponding case such hierarchy of AIT has to differentiate between relevant topics in which ambiguity is likely to emerge and is responded to by a certain degree of tolerance/intolerance from specific individuals or groups or nations or cultures. Relevant, for instance, and informative for a comparison Poland-Germany seem to be topics on the IMA subscales, like ''role stereotypes'', which could be differentiated further in ''sex related'', ''age related'' and so on; or a category like ''social relations'', which may be subcategorized in ''parents'', ''peers'' and so on; or ''religious orientation'', which is not included in the subscales of the IMA at all, but seems to me of high importance especially in Poland.

Our first results will already show whether the IMA gives more detailed information for our comparison than the AIT-16, as is postulated in our changed concept. And if data are more similar or different on this or that scale or in some subscales but not in others, this will give us first hints on the national profiles and on fruitful differentiations to be made with further questions to be developed.

There will be methodological problems in our explorative study, some of which may only be solved in later research:

1. Of course the psychometric properties of the translated German questionnaires have to be tested again in the Polish version and sample.

2. Cross-national differences in these properties may depend
   – on translation and formulation of the items,
   – on differences in what in Poland and in Germany is already perceived as more or less ambiguous, and
   – not till the points a) and b) are under control can differences in the scales, subscales and items really be attributed to AIT.

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NIETOLERANCJA DWUZNACZNOŚCI – BADANIA POJĘCIA OGÓLNOŚCI ORAZ IMPLIKACJE HEURYSTYCZNE

Koncepcja nietolerancji dwuznaczności (Frenkel-Brunswik) zaowocowała różnymi badaniami, w których konstrukt podlegał operacjonalizacji na różne sposoby. Brak natomiast badań, które nawiązywałyby do jednolitej strategii badającej ogólny konstrukt. W pierwszym eksperymencie uczestniczyły dwie grupy studentów (po 20 w każdej), w drugim badaniu udział wzięło 30 osób. Badanym demonstrowano serię odwracalnych figur z dwuznacznym, lecz na ogół nieodwracalnym obrazkiem. Używano przy tym różnych instrukcji. Równocześnie stosowano dwa kwestionariusze. Stwierdzono, że ogólne pojęcie i uzasadnienie koncepcyjne, odniesione do ujęcia proponowanego przez Frenkel-Brunswik w 1948 r., współcześnie należałoby odnieść do ,,specyficznych emocjonalno-poznawczych właściwości przebiegu procesów informacyjnych'' (Reis 1996, 7). Wykorzystanie zastosowanych w badaniach kwestionariuszy okazuje się lepiej ujmować konstrukt, niż jego operacjonalizacja poprzez odwracalne figury.

Słowa kluczowe: nietolerancja dwuznaczności, pojęcie dwuznaczności.