

**Pragmatic and attitudinal meanings of pitch patterns
in German syntactically marked questions**

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1. Research question and hypotheses

It is a firmly established textbook statement that syntactically marked questions in, e.g., English or German show a tight correspondence between syntactic form and prosodic patterning: word-order ('yes'-'no') questions have final rising, question-word questions final falling intonation (Halliday 1967, 1970; von Essen 1964). von Essen codified this postulated syntax – prosody link terminologically by coining the term 'interrogative intonation' to refer to a high-rising pitch pattern as is found in word-order questions. Deviations from these patterns are mentioned, but interpreted as attitudinal overlays on phonological form determined by sentence type.

The research question should be formulated differently: What are the pragmatic and attitudinal meanings associated with falling or rising patterns in the two sentence types? Thus *both* patterns are regarded as conveying specific paralinguistic meanings in each of the syntactic structures, instead of a basic phonological pattern being associated with one of the structures and the other pattern in the same structure with attitudinal modification. In this view, the pragmatic and attitudinal functions of an interrogative structure in a communicative context determine the choice of the intonation pattern.

The textbook statement and the reformulated research question have been tested in three steps, based on three hypotheses.

- **Step1 – frequency distribution of falling and rising pitch in the two structures**
The statistical evaluation of a large spontaneous corpus provides the empirical distribution of the two intonation patterns in the two syntactic structures.

Hypothesis 1

Both intonation patterns occur in each of the syntactic structures, but word-order questions have more rising patterns, question-word questions more falling ones.

- **Step 2 – pragmatic and attitudinal functions of the four syntax – prosody pairings**
Text interpretation of falling and rising patterns in naturally produced corpus data and in their resynthesis with the complementary pitch pattern provides an empirical assessment of semantic components and contextual compatibility of the four possible syntax – prosody pairings.

Hypothesis 2

In the two syntactic question structures, rising intonation conveys an orientation towards the addressee, expressing friendliness, interest, and openness with regard to the expected answer, whereas falling intonation is fact or speaker directed prejudging the answer as routine, or as categorical or at least restricted expectation.

- **Step 3 – explaining the frequency distribution**

The textbook statement, which is based on intuition and reflected in the frequency distribution across the syntax – prosody pairings in a German spontaneous database, needs to be explained in relation to the reformulated research question. The two syntactic question structures suggest associations with different semantic and pragmatic functions: calling upon an addressee to provide specific information in a question-word question as against asking for a decision between a 'yes'-'no' polarity in a word-order question, i.e. speaker and fact vs. addressee orientation. These different meaning functions of syntactic form may prejudice the use of falling or rising pitch patterns, respectively.

Hypothesis 3

In the course of communication in a particular setting, participants decide on how the semantic and pragmatic default link is to be restructured by a decrease in fact and speaker orientation and a complementary increase in concern for the addressee or vice versa. Thus word-order questions are realised with falling pitch to indicate an expected polarity decision and question-word questions with rising pitch to express friendliness.

2. Method

The investigation is based on the *Kiel Corpus of Spontaneous Speech, vols. I and II* (IPDS 1995, IPDS 1996), which provides orthographic annotations as well as segmental and prosodic phonetic transcriptions for the recorded speech data. The prosodic labelling was done in PROLAB (Kohler 1997), which is built on the *Kiel Intonation Model (KIM)* (Kohler 1991, Kohler 1997). The two types of questions are orthographically marked by <?>, and search operations can extract all instances of orthographically marked questions from the database. Further search operations retrieve the question-word questions from this excerpted data set and then the word-order questions from the remainder of this set.

In the prosodic transcription of the two resulting question sub-sets, accent positions are labelled and classified as peak (falling) or valley (rising) contours, variously synchronized with articulation as early/medial/late fall or early/late rise, respectively; rising contours may be either high or low rising (Kohler 1997). Search operations can generate subsets within each syntactic structure according to the peak or valley manifestation of the last accent in the question. Thus frequency distributions of pitch patterns across the two interrogative structures can be produced automatically.

Subsequently, instances of each of the four syntax – prosody pairings (initially ignoring differentiations into various synchronizations of peak and valley contours) are semantically interpreted in their contextual settings. In a complementary step, selected examples are resynthesized, changing the pitch pattern from falling to rising or vice versa in each case, using *praat* (Boersma and Weenink), and interpreted in the same naturally produced context with regard to contextual compatibility and pragmatic and attitudinal change of meaning.

3. Results

3.1 Hypothesis 1

The following table gives the distribution of absolute and relative frequencies of falling (f), high rising (hr), low rising (lr) and other (o) pitch patterns in question-word and word-order questions.

	f	hr	lr	o	total
word-order	25 (21%)	47 (39%)	37 (30%)	12 (10%)	121 (100%)
question-word	98 (57%)	17 (10%)	42 (24%)	15 (9%)	172 (100%)

This confirms hypothesis 1:

- Falling and rising patterns occur in both interrogative structures.
- Word-order questions have predominantly rising patterns, question-word questions predominantly falling ones.
- There is a negligible proportion of high rising contours in question-word questions, whereas this pattern dominates in word-order questions.

3.2 Hypothesis 2

Text interpretation and systematic resynthesis of complementary pitch patterns in selected examples converge in the evaluation that in both syntactic structures rising pitch expresses friendliness, interest and openness towards the addressee, while falling pitch focuses on routine, lack of interest and categoricalness. The expression of concern for the addressee is greater in a late than in an early valley, i.e. when the rising pitch sets in late in the accented syllable. An early valley conveys matter-of-fact friendliness. The expression of personal engagement increases with the extent of the rise.

This confirmation of hypothesis 2 will be illustrated, in the following sections, by the discussion of relevant examples in the two syntactic structures, with reference to systematically resynthesized audio examples. In the *Kiel Corpus*, both male and female speakers use both pitch patterns in both interrogative types. In male speakers, the falling pattern frequently ends in creak, which makes it difficult to generate a natural sounding resynthesis of the utterance with a rising pitch. Since the data presentation aims at selecting naturally produced falling as well as rising patterns for the same structure (from the same speaker in each case, as far as possible) and at changing them to the complementary pattern for contextual interpretation, examples from female speakers predominate. The corpus examples and their resyntheses are numbered as **Audio Example n** and can be accessed at the URL

<<http://www.ipds.uni-kiel.de/publikationen/audiobsp.en.html>>.

3.2.1 Rising and falling patterns in word-order questions

In *würde Ihnen das passen?* ("would that suit you"; g091a013, female speaker ANS, **Audio Example 1**), a final rising contour occurs and conveys consideration for the listener: the speaker leaves the decision 'yes' or 'no' entirely open and does not indicate her own expectation. The same utterance resynthesized with a final fall suggests, instead, that the speaker prejudices the answer 'yes'; a late fall adds the feature of 'irritation' to the attitude signalled by the fall: "I hope you are not going to turn this offer down!" This is in keeping

with the semantics of the late peak, viz. 'experiencing something in contrast to one's expectation'.

In *haben Sie denn einen Termin noch im Mai frei?* ("have you got a free date for an appointment in May still"; g092a000, **Audio Example 2**), the same female speaker has a final fall to signal her confidence in finding a mutually suitable date in May, since she has just thanked her dialogue partner for the general invitation to come and see her. The resynthesis with a final rise produces a real request to suggest a date. In the case of an early rise, which signals casualness, the request sounds matter-of-fact. The late rise, on the other hand, introduces friendly concern for the addressee.

Of the 25 instances of falling pitch in word-order questions in the corpus, 6 occur in *oder* ("or") constructions, and contrariwise "or" constructions predominantly have falling pitch at least in the second part, e.g. *möchten Sie denn lieber den Samstag, oder bevorzugen Sie den Sonntag* ("would you rather have Saturday, or do you prefer Sunday", g096a003, female speaker ANS). In phrases of this type the speaker delimits the possibilities the addressee can choose from, so the answer is no longer left entirely open but is considerably prejudged, thus the falling pattern is the contextually most appropriate one, particularly in a hat pattern construction that fuses the two parts into a cohesive unit.

3.2.2 Rising and falling patterns in question-word questions

The question *was würden Sie denn davon halten?* ("what do you think of that?"; g094a000, female speaker ANS, **Audio Example 3**) ends in a falling contour and concludes a turn, in which the speaker proposes a meeting in preparation of a trip they will have to do together. The speaker's intention is not to sound the other person's attitude towards such an arrangement but to hand over the turn for a concrete suggestion of a date. With a rising pitch the speaker conveys the meaning of a serious question as to how the addressee feels about (the need of) a preparatory meeting.

In the question *an welchen Tagen hätten Sie Zeit* ("what days are you free?"; g095a002, **Audio Example 4**), the same female speaker ANS uses a rising contour. She refers back to previous turns in which an appointment was discussed in general terms and her dialogue partner mentioned that her timetable was very tight. So the question is a request for specification, which would naturally be expressed in a rising pitch. The resynthesis with a falling intonation is not contextually compatible. It would, however, be possible in the opening of an appointment scheduling.

So we are dealing here with a type of repeat question, which when focussing the question-word always has a rising intonation extending from the question word right to the end of the sentence. The request for repetition because information already provided was not sufficient or inadequately received fits into the semantic connotation of rising pitch on questions, directing attention away from the speaker and from facts to the addressee. This pitch pattern on this type of question-word questions has been mentioned variously in the literature (von Essen 1964; Halliday 1967, 1970).

Further aspects of the use of pitch in question-word questions emerge in the example *wie wäre es denn mit einem gemeinsamen Besuch in Stockholm, <P> bei der ICPHS?* ("what about a joint visit to Stockholm, to the ICPHS"; g105a000, female speaker UTB, **Audio Example 5**). The speaker focuses both the place of the visit and the meeting within it, producing two prosodic phrases, separating them by a pause, and using late peak contours on

the second syllable of *Stockholm* and on the last syllable [ɛs] of *ICPhS*. But whereas the former rises to 380 Hz and then falls to 215 Hz over quite a long stretch of voicing, the latter, being squeezed into a short vowel before a voiceless fricative, gets its descent curtailed due to lack of time: it only falls from a comparable peak value of 370 Hz by about 40 Hz over 40 ms. But this small F0 decrease in a short time is sufficient for a listener to perceive a peak contour focus, rather than a rising contour. For a rising contour to be perceived pitch has to rise continuously to the very end of voicing in the prosodic phrase. With this double focus, the speaker makes a categorical factual statement about where the visit has to be arranged and hands over the turn to the dialogue partner to suggest dates.

If both peak contours are replaced by late valleys the semantic connotation is quite different: the speaker asks her partner for her opinion as to whether they should make this visit. In the context of scheduling predetermined appointments, known to both dialogue partners, this meaning and the pitch that carries it are not appropriate. If the first peak contour is kept and the second one is changed to a rising pattern, the speaker fixes the place and tentatively adds the meeting as a possibility for a visit there. This is again not context compatible in the appointment scheduling scenario. If the second peak contour is kept and the first one is changed to a rising pattern, the result sounds odd and does not seem to fit in any context because the listener does not expect categoricity after a request.

3.2.3 Pitch patterns in sequences of question-word questions

Example 5 in 3.2.2 has already demonstrated the mutual dependence of pitch patterns in contiguous prosodic phrases of question-word questions. This prosodic adjustment in sequence due to pragmatic adaptation can be further illustrated by examples of more than one question-word question in succession. A case in point is *und wie sieht es denn aus noch mal zu einer eintägigen Arbeitssitzung? wann wäre Ihnen das dann angenehm?* ("what about another one-day working session? when would that suit you?"; g101a014, female speaker NAR, **Audio Example 6**). Both questions have final rising contours: *eintägigen* and *das*, respectively, are the last fully accented words in each phrase, with peak patterns that end in plateaus from which the partially deaccented words *Arbeitssitzung* and *angenehm* rise (for the latter to receive full accents there would have to be downward dips from the plateau into the rise (Isačenko and Schädlich 1970). The semantic connotation is one of friendly interest in finding out when it would suit the other person to have the scheduled meeting.

When both final accents are to be associated with a falling pattern it must, in each case, start below the F0 endpoint of the preceding word to recapture the same deaccentuation. With such a repeated falling contour the speaker invites the addressee in a matter-of-fact way to give a date, rather than expressing a request to name preferences.

If the first question ends falling, the second rising, the speaker asks a matter-of-fact question, realises that it may be misunderstood because it lacks precision and friendliness, and then adds a specification with more concern for the other person's decision. The reverse order of pitch patterns, however, would take back the friendliness on the first question by a matter-of-fact enquiry about when it would suit. As in Example 5 of 3.2.2, this progression clashes with the listener's expectation and also produces an incongruence between the semantics of the adjective *angenehm* "agreeable" and the attitudinal meaning of the falling pitch. This pattern combination is therefore least likely to occur.

An even more complex example is provided by *wie sieht es bei Ihnen aus? <P> wann haben Sie dann Zeit, <P> daß wir <P> uns noch mal besuchen können?* ("how is your timetable?

when are you free so that we can visit each other again?"; g102a000, female speaker UTB, **Audio Example 7**), where in addition to the succession of two question-word questions, the second one contains two prosodic phrases, separated by a pause, in conjunction with a syntactic construction of main and subsidiary clauses. The subsidiary clause gives the necessary specification to the "when"-question, thus the two together form a meaningful whole that should also be given prosodic cohesion. A high degree of cohesion would be achieved by a single prosodic phrase spanning both syntactic clauses. In the present case, the repetition of the same phrase-final pitch pattern constitutes a cohesive bridge across the pause separator. The first question-word phrase is not a question for information, but a set phrase of turn opening in an appointment scheduling scenario, providing the introduction to the actual question which follows. From this dialogue constellation the sequencing of three prosodic phrases with final falling pitch each, as found in the corpus, is to be expected.

If all final contours are changed to rising the sequence conveys friendliness and introduces a real request for a date that is convenient to the addressee. This still applies if the set turn opening is falling, but the following question rising. The reverse order, however, would again not be acceptable because it would associate friendly concern with the set phrase and matter-of-factness with the actual question, which clashes with the pragmatic constellation of the dialogue. In all cases, the main and the subsidiary clause of the second question have to have the same final pitch pattern, either falling or rising.

3.2.4 Pitch patterns in sequences of word-order questions

The corpus contains one example of two word-order questions in succession: *soll ich dann zu Ihnen kommen, ja? <A> ist das <äh> Ihnen dann recht?* ("shall I come to you then? is that <äh> all-right with you?"; g122a007, male speaker OLV, **Audio Example 8**). The first one is made up of two prosodic phrases, the actual question and the interactional particle *ja* "isn't that so", which is added to address the listener for confirmation. The first question by itself, as well as the second question, have final falling pitch, the particle adjunct can only be rising. The speaker assumes that the addressee wants to have the meeting at the latter's place, and he strengthens this assumption of a positive answer by the interactional particle *ja* on rising pitch, conveying the meaning "I suppose that's what you would like". In such a context the second question is expected to have falling pitch. It is a conventional set phrase and does not call for a free decision on the part of the listener, as would be the case with a late rising intonation, which expresses personal concern, clashing with the meaning conveyed by the interactional particle. An early rise, signalling matter-of-fact politeness, would, however, be a possibility in the context, picking up the preceding polite assertion of what the speaker expects.

There are thus the same pragmatic limitations on the use of phrase-final pitch patterns in sequences of the two syntactic question structures, conditioned by context of situation and speaker – listener relations, not primarily by the syntactic pattern itself. If the speaker had used a declarative structure, such as *ich komme dann zu Ihnen* "I'll come to you, shall I", the interactional particle could have been *ne*, beside *ja*, again with rising pitch, asking for confirmation of an even more strongly worded assumption. The second question with final falling, or early rising pitch, would fit into this context, too. With the alternatives of declarative/interrogative in the first phrase and falling/early rising in the last, it is possible for speakers to attune their attitudes of social politeness very finely to the firmness of their assertions, without introducing engagement for the listener. *ich komme dann zu Ihnen, ne. ist Ihnen das recht?*, with falling pitch on the question, combines the strongest assertion with a minimum of social politeness. At the other end of the scale, in *soll ich dann zu Ihnen kommen*,

ja? ist Ihnen das recht?, with early rising pitch on the second question, the expression of firmness is softened most by a concomitant increase of politeness.

3.2.5 Pitch patterns in sequences of question-word and word-order questions

There are also cases of mixed series of question-word and word-order questions, in either sequence. The male speaker of Example 8 in 3.2.4 provides the following instance: *also sollen wir den dann lieber in den Oktober legen? wie sieht's da bei Ihnen aus, mit Wochendterminen?* ("should we then rather have the appointment in October? how does that fit in your calendar, as regards weekend dates?"; g123a009, **Audio Example 9**). There are three prosodic phrases, with rises on *legen*, *aus*, and *Wochendterminen*. The speaker asks the listener for a decision as to postponing the meeting, and then enquires about possible dates, more specifically at weekends; he does not prejudge any outcome. If all the phrase-final pitches are changed to falling, the speaker assumes that the addressee will agree and will have dates available, also at weekends, since there is a whole month to choose from. If the first two patterns are falling, the third rising, the same assumptions apply as to agreement and general availability of dates, but the third rise indicates that the speaker then enquires separately and specifically about the weekends, which may cause a problem. The reversal of the latter sequence to two rising patterns and one falling again sounds odd because it violates expectation by a matter-of-fact assumption after a friendly request.

In g076a005, male speaker TIS (**Audio Example 10**) produces the opposite order of syntactic questions, both on phrase-final falling pitch: *Wie sieht das aus bei Ihnen? haben Sie da irgendwelche <P> besonderen Terminwünsche?* ("what does your calendar look like? have you any <P> special requests for dates?"). These questions are preceded by vague suggestions about appointments that still have to be fixed, and the speaker continues in this vagueness with a summarising set question-word phrase, showing no involvement. This attitude determines the falling patterns.

With rising patterns in both cases the speaker expresses involvement. (In spite of final creak in the second question, the synthesis quality of the rising pattern is quite satisfactory.) The introduction of involvement still applies to the sequence falling – rising. However, the expression of involvement is less likely in the situational context of the dialogue turn as a whole, which is characterised by a general lack of concern for the addressee and by routine appointment scheduling. The reverse order is again ruled out on general grounds as in the examples discussed in the preceding sections.

3.3 Hypothesis 3

The contextualization of examples under Hypothesis 2 has clearly demonstrated that, although a default link between syntactic question type and prosodic pattern may be assumed, on the basis of different pragmatic interpretations of the two question structures, speakers fit the associated prosodies and the attitudes these express towards hearer, speaker and facts into the context of situation. So the assumed default link is adapted to the demands of communication. The analysis of sequences of question structures shows further that there are combinatorial restrictions of falling and rising patterns, due to the attitudes they convey. The pitch patterns

- tend to be set uniformly as either falling or rising across several prosodic phrases in question structures, thus marking an attitudinal pattern,
- or they may be excluded generally, e.g. the sequence rising – falling,

- or they represent a general combinatorial possibility across several prosodic phrases, e.g. all falling or rising, or falling – rising, but they do not fit the attitudes expressed in the much wider dialogue turn.

Hypothesis 3 has therefore been confirmed. As regards the explanation of the frequency distribution across the four syntax – prosody pairings under hypothesis 1, we may refer to different semantic and pragmatic functions of the two syntactic question structures: asking to provide specific information in a question-word question as against asking for a decision between a 'yes'-no' polarity in a word-order question. Speaker and fact vs. addressee orientation may thus prejudice the use of falling or rising pitch patterns, respectively.

This explanation is not only strengthened by the data interpretation of 3.2, but by English data presented by Fries long ago (Fries 1964). In his extensive American English corpus (39 television-radio programmes in which a panel of four persons, using, in turn, only yes-no questions, attempted to discover the precise vocation, occupation, or special activity of each of several 'contestants'), he found, over all speakers, 61.7% examples with falling and 38.3% with rising intonation. This result was contrary to the textbook statement, also given for English. He comments on it as follows: "The circumstances in which the programmes were carried on made the speech forms used by these panellists the actual live conversation of language actively fulfilling its communicative function. The speed and spontaneity of the language activity of these panellists reduced to practical zero the chance that the intonation forms of that language activity could have been premeditated or deliberately chosen." (p. 247)

In the structuralist tradition, Fries only provides the empirical data without attempting to explain them. He concludes: "The facts seem to support the conclusion that in English (at least in American English) there is no *question intonation pattern* as such. ... when one compares the intonation patterns of all yes-no questions with the intonation patterns of all other types of questions, he will find that, even with the ratio 3 to 2 in favour of falling intonation patterns for yes-no questions, which the evidence here supports, there will be a higher proportion of rising intonation patterns on yes-no questions than on other questions. But there seem to be no intonation sequences on questions as a whole that are not also found on other types of utterances, and no intonation sequences on other types of utterances that are not found on questions." (pp. 250f)

Fries leaves unexplained

- (a) why his data show the opposite trend to what the textbooks say
- (b) why yes-no questions still have more rising contours.

As regards (a), the key is contained in the communicative situation: panellists word their questions in such a way as to reflect the speaker's construction of facts to ascertain the highest possible number of 'yes' responses in order to win the game, i.e. the addressee's free decision between the answers 'yes' and 'no' is not a prime concern. This is the typical case of speaker and fact orientation, and therefore associated with falling pitch. This does, of course, not mean that listener orientation does not occur; it is very common in repeated questions when they were not heard clearly or not understood. In this case, it was the same question, asked twice by the same panellist and directed to the same person, almost immediately after the first one. In this repetition, listener orientation comes in after the factual question has been asked, i.e. rising pitch is very likely. There are also cases where the first utterance of a repeated question has rising intonation, signalling listener orientation, and the second has falling pitch turning factual.

As regards (b), the explanation again points to a default link between syntactic structure and pragmatic interpretation. Although Fries is right in rejecting a *question intonation* as such, determined solely by the syntactic form, the probability of rising pitch in word-order questions is much higher than in question-word questions and vice versa for falling pitch. The actual pitch manifestation in dialogues depends on the interaction of the syntactic structure, its general pragmatic interpretation and its placing and attitudinal colouring in the communicative situation.

These data show very convincingly that corpus analyses which are only approached from a descriptive statistical point of view, like Fries', miss important explanatory aspects, which come into focus if the data are investigated on the basis of hypotheses about the communication process. This also means that contextualization is not only regarded as a key to the understanding of the use of pitch patterns in speech communication, but that prosody needs to be conceptualized theoretically as a constitutive independent element of meaning beyond concrete activity as found *hic et nunc* in a corpus. This approach thus follows Selting (1995) as far as the focus on the communicative setting is concerned, but goes beyond the individual corpus data to arrive at generalities in the communication triangle of speaker, hearer and factual representation (Bühler 1934).

Prosody as an independent element of meaning may be related to Ohala's '*Frequency Code*' (Ohala 1983, 1984). It is an attempt, within phonetics and linguistics, to proceed from the phonetic base to the communicative function by relating phonetic substance, namely high vs. low F₀, to social behaviour, viz. subordination vs. dominance, irrespective of linguistic form. With reference to such external relationship between phonetic substance and social function, we can explain linguistic form, for example the use of high or rising F₀ in questions in the languages of the world. This way an explanans principle – functions of F₀ – is independent of the explanandum – the use of F₀ in linguistic questions, and the explanation avoids circularity. But this means, at the same time, that we have to give up the '*Linguist's Theory of Intonational Meaning*' (Ladd 1996).

4. Discussion

What is necessary in future intonation research is not so much the study of pitch production in lab speech, e.g. studies of peak alignment, but the production of pitch patterns in large corpora of various types of spontaneous speech, as well as their perceptual relevance in actual communication. On the basis of the data presented in this paper, we need to continue perceptual research in formal experiments with systematic manipulation of F₀ parameters, beyond simply rising or falling phrase-final pitch, to analyse the attitudinal functions of German questions in greater detail and to contribute to a theory of prosodic expression in speech communication (Fónagy 1983). Other forms of questions than the syntactically marked ones (declarative and elliptic sentences, question tags) need to be incorporated as well. In this prospective study the data level must be the phrase and the whole turn with authentic dialogue speech. This may be supplemented by systematic manipulation of prosodic parameters in simple sentences, carefully constructed on the database results. The perceptual test paradigm that should be applied is the semantic differential technique of Uldall's study of 1960 (Uldall 1960), which was revived by Dombrowski in 2003 (Dombrowski 2003).

Beyond the theoretical perspective, the study will also contribute to the methodology of spontaneous speech data acquisition and analysis, and of linking corpus analysis with systematic data generation in a communicative framework. Last but not least, the study should also

include the analysis of questions in different types of languages (languages without word-order question structure, a language like French without pitch accents, tone languages) to arrive at similarities and differences across languages, and thus to contribute to typologies and universals of phrase-level phonetics in communication.

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