

Process Grammar Model

Immediate Grammar and Adjustive Grammar

Hilofumi Yamamoto
Institute of Science Tokyo

April 17, 2025

1 Introduction

Immediate grammar is a grammar that corresponds to the situation where utterances are intuitively selected and promptly realized. Adjustive grammar is a grammar used for utterances with appropriate judgment and adjustive. As a framework for describing language use with two extremes, one that must be spoken immediately and one that is spoken after careful consideration and adjustive, we propose a process grammar model. Immediate grammar is not just about speaking anything right away, but there are strict rules for this. Adjustive grammar is important to choose the right words and use the right grammar, but depending on the degree of adjustive (or the degree of revision), there are several ways of expression, and there is a state of over-adjustment. This model, which considers the time axis of expression, is not something completely different from all previous grammar studies, but a framework for further developing previous grammar studies.

The feature of this model is to describe the dynamic characteristics of grammar in language considering the time axis. Language is operated through physical resources (cognitive processes of the brain, speech, symbol manipulation, etc.), making it possible to describe it mathematically. However, language is not just a physical system, and each part that describes matter has different properties from the physical quantities described in physics, making mathematical descriptions difficult. Physical systems (thermodynamics, electromagnetism, etc.) usually follow deterministic laws. On the other hand, language contains non-deterministic elements such as “immediate grammar” and “adjustment grammar.” In particular, language includes context dependency, semantic structure, and cognitive process influences, which cannot be fully explained by simple mathematical models. Therefore, a mathematical description of language must consider dynamic changes and decision-making processes while being based on physical resources. For example, real-time generation of speech (immediate grammar) is difficult to predict completely with deterministic laws, so it should be relatively understood and always show pairs to be compared like a binary opposition. For example, semantic ambiguity (e.g., “She has a daughter” is it my daughter or a girl?) and context dependency (e.g., “She met him” is it she met him or he met her?) are difficult to resolve mathematically. These problems cannot be ignored, nor can they be simply addressed by statistical probability theory. However, a mathematical model of language that considers the time axis may offer a new approach to these unresolved issues. For example, if it is immediate grammar, considering the real-time generation of speech, the problem of my daughter or a girl is resolved by the relationship before and after the speech. Also, if it falls under adjustment grammar, considering context dependency, the problem of ambiguity between she met him and he met her is resolved by adding words during the adjustment process.

2 Theoretical Background

Please refer to **Q1.** as well.

2.1 Relation to Dual Process Theory

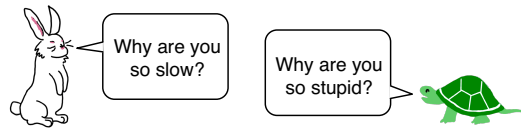


FIG. 1: Dual processing theory based on the presentation from “System 1 and System 2 Thinking”

TABLE 1: Differences in characteristics between System 1 and System 2

System 1	Example utterance immediate	System 2	Example utterance deliberate
Fast	“Whoa, that’s hot!”	Slow	“Be careful, it’s hot enough to burn you.”
Subconscious	“I have a bad feeling about this...”	Conscious	“There are several risk Factors here.”
Automatic	“Oh, go ahead!”	Effortful	“Should I say ‘please go ahead’...?”
Heuristic	“It’s always like this, so it’ll be the same this time.”	Analytical	“Looking at the past five cases, this one might be different.”
Associative	“This smell... reminds me of something.”	Rule-based	“This fits the typical pattern according to theory X.”
Implicit	“Yeah, kind of like that.”	Explicit	“A leads to B, and that causes C.”
Emotional	“I can’t take this anymore!”	Logical	“There are three problems with that approach.”
Intuitive	“Something just feels off.”	Rational	“Considering the costs and risks, this option is more reasonable.”
Error-prone	“It’ll probably be fine!”	Reliable	“I’ve verified it with multiple sources.”

The Process Grammar Model is similar to the framework of “System 1 (fast thinking) and System 2 (slow thinking)” referred as the Dual Process Theory. However, this model has a unique perspective focusing on immediacy and adjustability, rather than being a mere application.(Evans 2008; Kahneman 2011; Squire and Kandel 2009)

2.2 Limitation of “spoken language” and “written language”

In traditional linguistics, it has been said that “spoken language has high immediacy and written language is revisable.” However, in SNS and live streaming, the situation of “speaking while writing” is increasing, and it cannot be explained by a simple binary opposition. This study proposes the name “Process Grammar Model” as a framework to explain the mechanism of language use, rather than calling surface acts as language forms, to organize such phenomena.

2.3 Clause chaining and additive constructions

“Immediate grammar” is most closely related to the linguistic phenomenon of clause chaining that has been studied to date. Clause chaining has been widely studied as a method to indicate grammatical continuity. By linking multiple clauses while maintaining the structure and meaning of sentences, clause chaining expresses the continuity and relationships of information. Clause chaining is a useful method for explaining the continuum of immediate and adjustment grammars.

Sakakura (1975) expressed the construction of Japanese text as “adding one after another,” and Komatsu (2003) stated that it is “constructed by adding one after another,” pointing out the characteristics of clause chaining in Japanese poetry and prose. Such expressions emphasize that the construction of sentences is sequential and flexible, suggesting that the relationships between each phrase are not necessarily close. Kondo (2005) also stated that “since it is added, it is difficult to define which is the main clause and which is the subordinate clause in the resulting compound sentence,” indicating that the hierarchical structure of clauses is ambiguous. These considerations suggest that language use is based on the natural order in which acts and events are recalled, rather than following syntactic binding rules. They reveal that language utterances are based on flexible adaptations to the flow of the speaker’s thoughts and the situation, rather than grammatical adjustments. Therefore, such immediate speech processes are considered to be universally observed features in language development and communication.

2.4 Clause chaining and linking methods of phrases

Clancy (2020) studied the use of clause chaining in Japanese narratives, where 60 children (aged 3-7) and 10 adults retold stories after viewing picture book storytelling and short videos. This study examined the methods of linking phrases, the timing of their completion, and semantic relationships (simultaneity, causality, temporal order) in detail. The timing of phrase completion was confirmed to be related to changes in characters and the end of important story units. Furthermore, the results of comparing children’s and adults’ stories showed that factors influencing the linking of phrases exist regardless of age.

The responses in children’s stories are thought to naturally appear in a form close to immediate grammar. When telling stories, children often repeat responses in short units, and it is noted that the chaining of phrases is not always logically coherent. This is considered to reflect the characteristic of immediate grammar, where sentences are constructed immediately. Children’s immediate responses are dominant at a stage where linguistic adjustments are minimal, and they intuitively connect to the next phrase. This immediate response plays an important role in the process of language development and serves as a foundation for learning complex syntax and grammatical adjustments. The flexibility and fluidity that children exhibit when creating sentences are considered to be related to the characteristics of immediate grammar.

3 Immediate Grammar and Adjustive Grammar

TABLE 2: Comparison of Immediate Grammar and Adjustive Grammar

	Immediate Grammar	Adjustive Grammar
Nouns, noun phrases only	Just now, curry udon, done. So to speak, like music notation.	The curry udon has just been completed. This corresponds to music notation.
Omitting “wa” particle	How about my explanation?	Is my explanation being conveyed properly?
Adverbs only	Certainly.	Certainly, that point is valid.
Demonstratives only	This becomes like this.	This element changes like this.

Immediate grammar is short and has high real-time characteristics. It is established in the smallest unit. Traditionally, it has not been considered as a sentence, but such forms are more prominent and widely used in SNS and live streaming. Adjustive grammar has a clear sentence structure and is a grammar that can be revised.

To confirm the existence of immediate grammar, it is generally necessary to shorten what is commonly called a sentence and capture the form when it can be spoken briefly to the person in front of you, classifying it with names such as “noun stop” and “adverbs only” to reveal its characteristic rules. Here, to succinctly show the characteristics of immediate grammar and adjustive grammar, the comparison of the two is shown in Table 2.

3.1 Immediate Grammar

Characteristics: Instantaneous speech, frequent omissions, context-dependent, real-time processing

Examples: “How’s the taste?,” “Look!,” “Watch out!,” “Ordinary is the best”

Application: Everyday conversation, interjections, emergency speech

3.2 Adjustive Grammar

Characteristics: Careful selection, grammatically correct structure, revision

Examples: “Based on the results of this study...,” “Thank you very much”

Application: Formal speeches, papers, official documents

3.3 Strict Definition

It is important to emphasize the basic definitions and characteristics of immediate grammar and adjustive grammar, and to approach them from different perspectives. For example, if immediate grammar is understood as “a process in which speech is generated reactively on the spot” and adjustive grammar is understood as “a process of linguistic adaptation and correction,” it is easy to understand that the focus is different. The characteristic of immediate grammar is “immediate and reflexive selection,” and the characteristic of adjustive grammar is “intentional correction and confirmation,” and there are logically distinguishable aspects between the two.

4 Concept Diagram

Here, we show a concept diagram that shows the relationship between immediate grammar and adjustive grammar while looking at the entire Process Grammar Model (Figure 2).

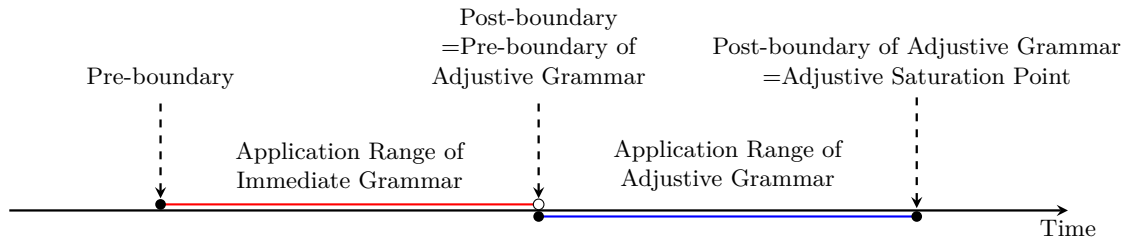


FIG. 2: Boundary between Immediate Grammar and Adjustive Grammar

4.1 Definition of Pre-boundary and Post-boundary of Immediate Grammar

The Pre-boundary is the point at which the application of immediate grammar begins, indicating the start of speech. The application range of immediate grammar is the interval from the Pre-boundary to the Post-boundary.

The Post-boundary indicates the end of the application range of immediate grammar, coinciding with the Pre-boundary of adjustive grammar. Beyond this point, speech or text is processed not by immediate grammar but within the framework of adjustive grammar.

4.2 Application Range of Adjustive Grammar and Adjustive Saturation Point

The Pre-boundary of adjustive grammar indicates the point at which the application of adjustive grammar begins. Adjustive grammar is applied when a certain amount of time is spent revising and correcting

speech or text.

The Post-boundary of adjustive grammar indicates the point at which further improvement is no longer expected after a certain amount of adjustment. This point is called the adjustive saturation point, indicating the end of the application range of adjustive grammar.

4.3 Boundary between Immediate Grammar and Adjustive Grammar

There is a boundary between immediate grammar and adjustive grammar, but there is no fixed boundary. Speech is “skilled” by going through processes such as rehearsing adjusted things many times, memorizing them, and fixing them as manuals. “Skilled” expressions are sometimes spoken immediately. This shows the continuous relationship between immediate grammar and adjustive grammar. Immediate grammar (System 1) and adjustive grammar (System 2) are not fixedly separated, but are set as a “continuum” because they mutually influence each other through “skill” or “experience.” In this way, speech may transition between immediate grammar and adjustive grammar.

In the Process Grammar Model, “immediate grammar” deals with intuitive and instantaneous speech, and “adjustive grammar” deals with conscious and analytical speech, but by mastering it, elements of adjustive grammar transition to the domain of immediate grammar. This is an example of the Process Grammar Model being a “dynamic model.” The phenomenon of the processing of System 2 transitioning to System 1 can be seen as part of a process that changes over time. This shows that it is a model of “process” rather than a fixed grammar.

4.4 Continuum of Immediate Grammar and Adjustive Grammar

Immediate grammar and adjustive grammar form a “continuum” that can transition depending on the situation and experience, rather than a simple binary opposition. For example, in language learning, when beginners create sentences, they use adjustive grammar (System 2), but with training, patterns that are frequently used can be output immediately, transitioning to immediate grammar (System 1). Through such a process of mastery, the roles of processing change between System 1 and System 2. Therefore, the roles of processing that each of System 1 and System 2 should be responsible for are automated, and sometimes the processing of System 2 functions as the processing of System 1. This phenomenon is the essence of the “continuum” in the Process Grammar Model, showing the complementary and inseparable relationship between immediate grammar and adjustive grammar.

However, the formats of immediate grammar and adjustive grammar are different, with them being at opposite poles. In actual language use, it is meaningful to consider them as a continuum because they often interact. In particular, immediate responses (e.g., the selection of utterances made instantaneously in the flow of conversation) and the subsequent adjustment (e.g., the correction of utterances and the confirmation of information) are often interrelated. While immediate grammar focuses on the instantaneous aspects of language use, adjustive grammar focuses on the adaptive aspects of language and the adjustment process. By preparing a format that treats these uniformly, it seems possible to more clearly show the dynamics of language use. However, this may ultimately shake the conceptual definitions of immediate grammar and adjustive grammar, so it is necessary to equip a preventive logic to ensure that they do not become too similar.

Fast processing is considered to be the use of System 1 rather than the process of System 2, but it is not derived from System 1, and the techniques developed by System 2 through experience and various heuristics can mature and be reborn as fast processing. (Evans 2008) Even for problems that should be carefully considered, it is often seen that processing by System 1 is used through experience of training and repeated playback. For example, in language learning, if you get used to constructing sentences that you cannot do immediately, you will be able to use them immediately. In such cases, it is considered that System 1 is used after mastery. On the other hand, when explaining new words or complex procedures, System 2 is likely to be used to eliminate misunderstandings.

5 Tasuki-gake/cross-directional Effect

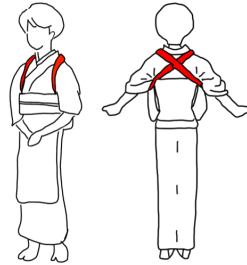


FIG. 3: Tasuki-gake: a method of tying a long cloth strap around the back to pull the sleeves of a kimono together, so that they cross over the back. This is done to prevent the sleeves from getting in the way while working.

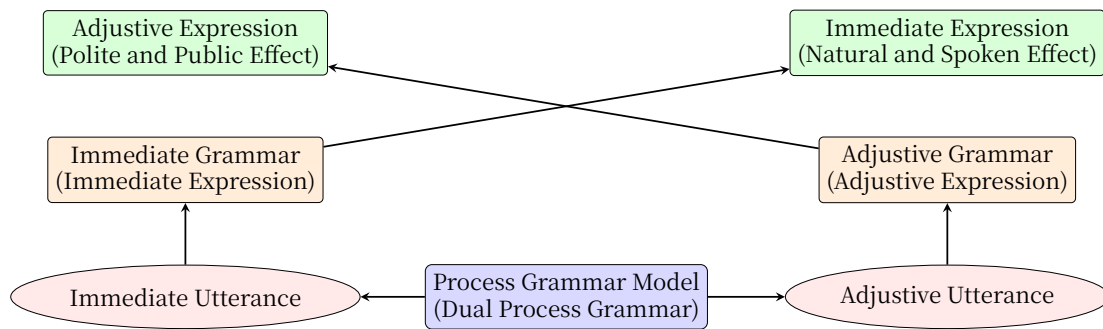


FIG. 4: Tasuki-gake Effect: A Visual Metaphor for Crossed Effects in Process Grammar. The diagram illustrates the traditional way of tying a tasuki sash. Just as the front-left is tied to the back-right, and vice versa, the relationship between utterance types and their perceived effects often crosses over. Immediate utterances can produce polite effects, while adjusted utterances may evoke natural or spontaneous impressions.

In this model, language use is fundamentally categorized by two temporal types of utterance: Immediate Utterance, which is produced spontaneously in real time, and Adjustive Utterance, which is the result of thoughtful planning and adjustment. Each type of utterance is governed by a distinct grammatical system. Immediate Utterance operates under Immediate Grammar, which facilitates intuitive and real-time chaining of expressions. Adjustive Utterance, in contrast, is governed by Adjustive Grammar, which supports expressions formed through careful deliberation and revision.

The expressions derived from these grammars are referred to as Immediate Expression and Adjustive Expression, respectively. However, a crucial feature of this model is that these expressions can produce cross-directional effects depending on how they are used. When an Adjustive Expression is highly practiced, formulaic, or trained for immediate delivery, it gives rise to the Polite and Public Effect, creating a sense of formality, refinement, or social appropriateness. Conversely, when an Immediate Expression is intentionally employed in written or scripted media—such as novels or interviews... it produces the Natural and Spoken Effect, evoking a vivid, conversational, and lifelike tone.

Thus, there is a crossed (tasuki-gake) relationship between the temporal nature of utterance and the effect of expression. This structure makes visible the richness of expressive function and practical use

that goes beyond a simple binary model.(Figure 3 and 4).

6 Description Method

6.1 Design of Appropriate Format

When linking immediate grammar and adjustive grammar, design a format that reflects the roles they play. In this format, clearly show the “flow of processes” that indicates when and how each process is triggered. For example, in immediate grammar, clearly indicate the timing of the occurrence of “reactive speech,” and by indicating the timing of “correction” and “confirmation” to be applied later, it is possible to visually express the complementarity of the two while maintaining different formats.

6.2 Consideration at the Meta-level of Distinction

Although immediate grammar and adjustive grammar may seem to be connected at first glance, they actually have different cognitive and social functions. It is a challenge to observe whether they function under different situations and cognitive loads. For example, if immediate grammar reflects “cognitive immediate responses” and adjustive grammar reflects “cognitive processes involving complex language adjustments,” the logic to distinguish between the two theoretical frameworks will naturally be established.

6.3 Confirmation of Distinction by Empirical Data

The purpose of collecting data to empirically support the theory is to build a system from specific speech examples in different contexts and usage situations of immediate grammar and adjustive grammar. By pinning down the characteristics of both immediate grammar and adjustive grammar on a map divided into dimensions with actual examples, it is possible to show that both poles exist and that the process grammar lies on top of them. By analyzing actual conversations and language data, it is possible to confirm whether the distinction between immediate responses and time-consuming adjustments, or the timing of these, makes the two poles ambiguous, and to organize them concretely.

One approach is to propose a method of linking the “reactive elements” in the format of immediate grammar with the “adjustment process” in the format of adjustive grammar. By positioning actual data that mediates both poles as a model, it is possible to specify the parameters of a model in which “immediacy” and “adjustability” in language use interact, and to create a model of a continuum of relative speech and expressions.

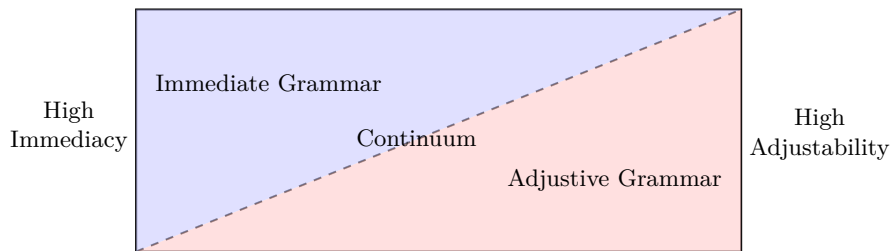


FIG. 5: Process grammar model of actual language use

TABLE 3: Characteristics of immediate and adjustment grammars

Item	Immediate Grammar	Adjustive Grammar
Characteristics	Grammar applied instantaneously on the spot. Little consideration or modification of form.	Grammar that considers the appropriateness of linguistic forms and makes adjustments as needed.
Time Span	Milliseconds to seconds. Processed in real-time.	Seconds to years. Adjustments may take a long time.
Examples	Reflexive responses, spontaneous conversations.	Press conference responses (with adjustments), speeches, editing of legal documents.
Adjustive Elements	Minimal or unconscious adjustments only.	Conscious adjustments to linguistic forms.
Purpose	Immediate information delivery.	Preventing misunderstandings and ensuring accuracy and appropriateness.

7 Future Directions

7.1 Research Questions

- The boundary between Immediate Grammar and Adjustive Grammar and its formalization (formulation of pre-boundary and post-boundary)
- Collection and analysis of empirical data (comparison of conversation data and written data)

7.2 Update Policy

Organizing and adding rules Application to language education and AI (natural language processing)
Consideration of analysis targeting waka and historical literature.

8 Conclusion

In this digest, we have outlined the Process Grammar Model, compared Immediate Grammar and Adjustive Grammar, and discussed the theoretical background. In future updates, we will expand the rule base and data analysis to further develop the model.

A About the Q&A Section

In this book, we have presented the theoretical model of immediate grammar and explored a new framework for language understanding through examples and applications based on it. However, when introducing such a new theory, it is expected that various questions and points of confirmation will arise from the reader’s perspective.

This “Q&A Section” aims to record the author’s position and supplementary considerations regarding such questions. Additionally, this section will include questions and discoveries that have emerged during the translation work (for example, “Tosa Nikki” and “Ise Monogatari”) and the daily collection of immediate grammar expressions (aead project).

To avoid “subtle discrepancies that arise every time I write” and to maintain the coherence of thought, this section will be used. It is assumed that the integration with the main text will be reconsidered later as needed, and this section is positioned as a flexible space for accumulation and examination.

A.1 Q&A: Immediate Grammar and Its Theoretical Background

Q1. What kind of theory is Immediate Grammar? How is it positioned in relation to existing syntactic theories?

A. Immediate Grammar focuses on the immediate and flexible forms of expression observed in language use and proposes them as structures that can be theoretically explained. This model is not positioned in opposition to syntactic-centered theories like phrase structure grammar but is a hypothetical framework that aims to describe human language behavior from a different perspective.

Q2. In what ways does Immediate Grammar contribute to language description?

A. By introducing the perspective of Immediate Grammar, utterances that have previously been considered "exceptional" or "lacking structure" can be positioned as a systematic form of language use. This can be seen as evidence that Immediate Grammar provides a theoretical "slot for explanation" for such utterances.

B Considerations from Examples and Practice

Q3. Is Immediate Grammar the same as spoken language?

Q4. Q&A: Why don't you use corpus-based automatic extraction?

A. In recent language research, methods for extracting syntactic patterns from corpora have been widely used. This is a very effective method for analyzing formal structures (word order, dependency, part-of-speech patterns). However, what Immediate Grammar targets is not just the form of syntax but the "way of speaking," "way of responding," and "expressions chosen at that moment," which cannot be judged solely by syntactic labels or structural information. For example, utterances like "そうそう、それぞれ" (yes, yes, that's it) or continuous expressions like "うん、でもさあ" (yeah, but you know) may seem grammatically ambiguous and fragmented, but they have a sophisticated structure based on immediate judgments, emotions, and the flow of responses. Such phenomena, even if present in the corpus, are often overlooked due to reasons like "not matching search criteria" or "not recognized as grammatical coherence," and it is believed that they can be more accurately handled through contextual judgment by human eyes and descriptive work based on experience. Therefore, in this study, we adopt an observational approach based on description and linguistic intuition, not in opposition to existing corpus-based methods but as a complementary one.

Q5. Q&A: Does Immediate Grammar ignore the procedures of recording, transcription, and analysis like conversation analysis or discourse analysis?

A. No, the position of Immediate Grammar in this study shares many commonalities with the "specificity of utterances" and "contextual dependence" targeted by discourse analysis and conversation analysis. In particular, the continuity of utterances, such as word choice according to context, timing, backchanneling, and rephrasing, is also an important observation target of Immediate Grammar. However, the analytical methods differ. In conversation analysis and discourse analysis, the procedure of recording audio → transcribing → structural analysis of utterance units is used to describe the interaction between participants. In contrast, the purpose of Immediate Grammar is to describe the patterns observed in such utterances as a model of the structures that speakers instantaneously select and manipulate. Therefore, while this study does not adopt the procedures of recording and transcription, it sufficiently references utterance materials and examples based on them, taking a complementary approach in that the focus of observation is on the "immediate structures being used." In short, Immediate Grammar does not contradict the results of discourse analysis or conversation analysis; rather, it aims to function as a structural explanatory model underlying the "detailed utterance phenomena" they depict.

Q6. How are chaining constructions or chaining grammar related to Immediate Grammar?

A. Chaining constructions or chaining grammar represent a common form used when constructing complex sentences in a dynamic and intuitive way. They are a key manifestation of Immediate Grammar. For instance, sentences formed with expressions like "and then," "but," or "so," which are

added successively as one speaks, exemplify the nature of Immediate Grammar, as they are generated without pre-planning the entire sentence. These forms closely correspond to how people construct language in real-time.

Q7. Why is it easier for non-native speakers to use constructions with "de" or "te" rather than complex noun phrases with "no"?

A. Japanese constructions using "no" require stacking modifiers in front of a noun, which demands structural planning and is characteristic of Adjustive Grammar. In contrast, constructions using "de" or "te" allow for sequential chaining of events or states, enabling spontaneous, step-by-step utterance—hallmarks of Immediate Grammar. For instance, the phrase "kinō eki de mita akai bōshi no onna no ko" ("the girl in the red hat I saw at the station yesterday") involves a complex noun phrase with multiple layers of modification. Meanwhile, a sentence like "Kinō eki ni itte, akai bōshi o kabutta onna no ko o mita" ("I went to the station yesterday and saw a girl wearing a red hat") follows a chronological flow and allows the speaker to build the sentence incrementally. This is similar in English: "The girl who wore a red hat that I saw at the station yesterday" is structurally demanding, while "I went to the station yesterday and saw a girl. She was wearing a red hat." is easier to produce and understand, especially for language learners.

C Examples of Immediate Grammar

C.1 Accumulation of Observations Supporting the Existence of Immediate Grammar

In this book, we present the theoretical framework of "Immediate Grammar," which is supported by multiple practical observations and records made by the author. For example, in the process of translating works like "Ise Monogatari" and "Tosa Nikki," many immediate expressions were found that are difficult to explain using conventional syntactic theories. Additionally, in the aead (An expression a day) project, we have been recording expressions with characteristics of immediate grammar in everyday Japanese, tagging them, and adding annotations to highlight the correspondence between language use and immediate grammar.

These tasks are not based on intuitive claims but are the results of observations accumulated over time. Hundreds of examples have been interpreted and described from the perspective of immediate grammar, providing empirical clues that demonstrate the effectiveness of immediate grammar as a descriptive model.

C.2 Allowing Sentences Ending with Nouns

Allowing Sentences Ending with Nouns: For example, sentences like the following are natural expressions from the perspective of immediate grammar.

1. Areha, sonou, areda. (That is, um, that.)
2. Yarukadouka wa, jibun shidai. (Whether to do it or not depends on oneself.)

References

- Clancy, Patricia M. (2020). "To Link or Not to Link: Clause Chaining in Japanese Narratives". In: *Frontiers in Psychology* 10. ISSN: 1664-1078. DOI: 10.3389/fpsyg.2019.03008. URL: <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2019.03008>.
- Evans, Jonathan St. B. T. (2008). "Dual-processing accounts of reasoning, judgment, and social cognition". In: *Annual Review of Psychology* 59, pp. 255–278. DOI: 10.1146/annurev.psych.59.103006.093629.
- Kahneman, Daniel (2011). *Thinking, Fast and Slow*. New York: New York: Farrar, Straus and Giroux.
- Komatsu, Hideo (2003). *Kakabun no koubungenri: zouhouban (The syntactic principle of Kana text)*. Tokyo: Kasama Shoin.

- Kondo, Yasuhiro (2005). “On the clause chain structure of adverbial clauses in Heian period languages (Heian jidai-go no fukushi setsu no setsu rensa kozo ni tsuite)”. In: *Kokugo to Kokubungaku (Japanese language and literature)* 82.11. URL: <http://iss.ndl.go.jp/books/R000000004-I7724417-00>.
- Sakakura, Atsuyoshi (1975). *Bunsho to hyogen (Articles and Expressions)*. Kadokawa Shoten. ISBN: 9784048540063. URL: <https://books.google.co.jp/books?id=gLA6AAAAMAAJ>.
- Squire, L.R. and E.R. Kandel (2009). *Memory: From Mind to Molecules*. Scientific American Library series. Roberts & Company. ISBN: 9780981519418.