

## Teaching Inferences Through Games

Jim SMILEY

### Abstract

Both lower- and higher-proficiency EFL Japanese students exhibit weaknesses in creating statements that express the results of ordinary and logical inferencing. Their prior educational experience includes adequate information regarding the structure of English, so their inability to produce such statements may be due to unavailing beliefs about the English structure. As the effect of direct instruction seems to be limited, implicit approaches may be more appropriate. Consequently, this study investigates the potential for using logic games in a task-based language teaching (TBLT) approach that introduces inferences through implicit learning modes. An individual case study was conducted to assess the likelihood of satisfying Skehan's (1998) four criteria for TBLT activities. The results indicate that logic games may be a viable method of instruction in ordinary and formal logical inferencing.

*Keywords* : inferencing, game pedagogy, comprehension, learner beliefs, task-based language teaching

### Introduction

While conducting a needs analysis for a hotel porter travel English course in Tokyo, I witnessed the following scene. The porter's task was to inform two guests how to get to their destination. His English ability was CEFR A1; that is, at the beginner level. The first guest wanted to go to Shinjuku. The porter said, 'You are subway'. To the second, who wished to shop in the Ginza, he said, 'You are taxi'. This exchange form is explained by Rubin (1998), who used the example *Boku wa unagi da*. One can imagine an English speaker learning Japanese translating this as *I am an eel*. The issue, Rubin points out, is that the sentence construction differences between the languages occlude critical syntactic implications that impede direct translation. In particular, the be-verb copula's position in English often mirrors that of the *wa* in Japanese, and English relies on sentence structure to indicate topicalisation as opposed to Japanese which has a direct topicalisation marker, *wa* (Rubin, 1998).

Crosslinguistic interference (CLI) has been researched intensely, and current knowledge about CLI indicates that it “can affect all areas of linguistic and communicative competence, including phonology, orthography, lexis, semantics, morphology, syntax, discourse, pragmatics, and sociolinguistics” (Jarvis & Pavlenko, 2008, p. 212). Jarvis and Pavlenko (2008) situate their work within the “psycholinguistic phenomenon of CLI, whose investigation can be seen largely as an endeavour that involves probing into the internal languages, or mental grammars, of individual language users” (p. 29). In Japan, Sasaki (1991) found evidence to suggest that Japanese learners of English have more susceptibility to retaining Japanese L1 information when using English than English native speakers learning Japanese, suggesting that CLI transfer may have more negative influence in the Japanese context.

The standard methodologies utilised in Jarvis and Pavlenko’s (2008) CLI research involve collecting data about patterns in the output of a single subject (*intrasubjective*) or from groups of subjects (*intersubjective*). In other words, the nomothetic drive emphasises general findings and rejects idiopathic evidence based on individual beliefs (Moses & Knutsen, 2011). Jarvis and Pavlenko’s definition of *knowledge* underscores this approach; “the term *knowledge* refers to implicit knowledge that can be examined empirically, for instance, through typicality judgments” (p. 116, italics original). Yet, the term *knowledge* has various meanings, and as Alexander (2016) notes, the *psychological* and *philosophical* definitions reside with the individual. These point to the need to investigate idiopathic beliefs.

I conducted an informal, exploratory survey into individual beliefs regarding the *be*-copula and *wa* topicalisation ( $n=59$ ) with a convenience sample of English proficiencies from three Japanese universities. I collected direct translations of simple statements (such as *I am Smiley*) and subjects’ stated rationales for their translations. Informally stated, those with low English proficiency (approximately CEFR A2) believed that *wa* is translated as forms of the *be*-copula. Higher proficiency subjects (CEFR B and above) without exception correctly reported that the Japanese *da*-copula matches the English *be*-copula. However, the advanced students produced statements such as:

Student 1: Where is Yuki?

Student 2: He slept too much, maybe.

Student 1: No, I saw him earlier. He didn’t oversleep.

This exchange demonstrates comprehensible utterances, but there is a lack of modality. *He slept too much, maybe* may be more naturally replaced by *He might have slept in*, and *He didn’t oversleep*, because it is an inferential claim based on direct empirical evidence, should be *He couldn’t have overslept*. When responding to my question about the location of a book, a student answered *It’s over there, I think* instead of the more appropriate *It may be over there*.

A commonality exists in examples from the lower- and the higher-level ability students. Both exhibit structural misconceptions regarding the use of the copula and modalities that lie between the subject and the post-verbal predicate. I surveyed the student-generated 80,000-word dataset that was collected for my doctoral project. The advanced students had acquired *can* for ability (as in *I can do that*), *should* for obligation (as in *I should study*

*harder*) and *have to* for compulsion (as in *I have to work more on this problem*). However, missing from this dataset were senses of modality centring on probability, logical necessity and selection of alternatives. There seems, therefore, to be an issue that links both the lower and the higher-level students in this regard.

This research was conducted as a proof-of-concept, and I make no wider claims about this phenomenon. Moreover, there are many methodological issues present and a more robust investigation is required. However, several questions arise from this exploratory step. The above examples from the hotel industry and Rubin (1998) were mirrored by the subjects. From their self-reports, the *belief* centring on the *wa/be* confusion is present in the lower-proficiency students. If the assertion is accurate that low proficiency Japanese English learners believe that the *wa* topicalisation marker maps onto the *be*-copula, how may the issue have arisen, where is it located, and, if it is a pedagogic issue, how can pedagogy address it more availingly? Furthermore, if there is a proficiency level effect in operation, might it be the case that the erroneous conception of the *be*-copula inhibits advancement in English? All these questions point to a need to investigate the nexus of linguistic representation of mental concepts and pedagogy. The nomothetic drive has dominated CLI research, but, as Marton (2015) demonstrated, much remains unknown when the idiopathic focus is ignored.

## Survey of Relevant Literature

This section reviews two areas of direct relevance to the questions highlighted above. The first section investigates how the *be*-copula is taught to lower secondary learners. The review question centres on reasons for the conceptual difficulties held by university students. The second section follows from the first and surveys current methods in inference pedagogy that may help overcome any issue discovered.

### Pedagogic Background

This paper proceeds by surveying typical Japanese pedagogic materials that present the *be*-verb as a copula. These examples are given, not to criticise textbook producers or preparatory schools, but to demonstrate the range of pedagogic techniques that university learners may have experienced. Fukuda's (1987) approach is standard. The terms *subject* and *predicate* are defined in Japanese and an example is provided:

“My **father is** a high school teacher.  
(父は高校の教師です)” (p. 13).

Note that the original bold **father** is categorised as the subject and the **is** as the start of the predicate. Fukuda (1987) focuses on the subject/predicate distinction and omits an explanation of the *be*-copula. Additionally, in Fukuda's text and in all surveyed, there is no discussion of Japanese syntactic elements. Teachers assume learners know these. This assumption may not be reliable. I informally surveyed five preservice students who have a English teacher's

licence about how they might explain the term ‘verb’ to a first-year middle-school learner. All their explanations were hesitant, incomplete and, at times, contradictory. More research is required into Japanese teachers’ metacognition, especially in relation to their subject-knowledge definitions. At this point, I can hesitantly suggest that even if teachers (albeit preservice-qualified students) have difficulty in basic definitions, middle-school learners cannot be expected to grasp such concepts easily, if at all.

Fukuda’s (1987) text is dated, but all current texts-in-use surveyed present English information in a similar way. Another source of information comes from *Gakushu juku* schools that provide extracurricular education. Benesse (n.d.) are a major *juku* (preparatory school) in Japan. Their website offers this lesson aimed at middle school first-year learners:

“ [be動詞]

現在形のam, are, is, 過去形のwas, wereの5とおりがあり, 主語と後ろの語句を=(イコール)で結ぶはたらきをします。[例]

1. You are my friend. [*anata wa boku no tomodachi desu*]

(あなたはぼくの友達です)

2. This is my book. [*kore wa watashi no hon desu*]

(これはわたしの本です)”

(Benesse, n.d.).

This explanation clarifies the meaning of the copula: ...主語と後ろの語句を=(イコール)で結ぶはたらきをします [The *be*-verb functions as an equals sign and connects the subject with the remainder of the sentence] (my translation).

Once again, the deductive nature of the explanation is apparent. For semantic items, *you*, *my* and *friend* in example 1 can be mapped directly onto *あなた* (*anata*), *ぼくの* (*bokuno*) and *ともだち* (*friend*). However, the status of the *are* and *です* (*desu*) need to be inferred as being equivalent. Deductive inferences are necessary; that is, *desu* must be *are* in example 1 and must be *is* in example 2. The evidence presented above strongly suggests that low proficiency learners do not make this inference.

Why this inference is not made is not currently known. Rubin (1998) and Maynard (1997) discussed other functions of *desu* and its morphologic variants. One potential confounder is its use as a politeness marker. Depending on the communicative situation in authentic Japanese discourse, *da* and *desu* and other variants may be used or omitted. If the deductive inferences (that *desu* must be *are* in example 1 and must be *is* in example 2) are not made, a plausible explanation may be that learners do not consider the printed *desu* as a copula but as a politeness marker instead because it is printed in a book and such a use of *desu* to a general readership is standard (Rubin, 1998).

Another possibility is that middle school first-year learners do not have sufficient metacognitive skills to comprehend abstract syntactical terminology that is not explained in Japanese. I believe that this may be the most likely explanation, based on my experience with third- and fourth-year English major Japanese preservice teachers. In classroom and tutorial situa-

tions, these students rarely demonstrate metacognitive comprehension of Japanese structural items, such as *wa* and *ga*. If such students do not comprehend the fundamental aspects of syntax (in Japanese or English), it is highly unlikely that 12-year-old learners will either. However, investigating that is beyond the scope of this paper.

Shuei Yobiko (Shuei, 2020), another major provider of extracurricular English instruction to secondary school level pupils, also emphasise the *equals* function of the *be* copula.

I am Mika.	私 = ミカ	[ <i>watashi = mika</i> ]
You are kind.	あなた = 親切	[ <i>anata = shinsetsu</i> ]
He is a teacher.	彼 = 先生	[ <i>kare = sensei</i> ]

(Shuei, 2020).

However, in demonstrating the accurate functional use of *be* as *equals*, Shuei (2020) explicitly denies the association of *be* with *desu*:

“be動詞は「です」ではなく「イコールの働きをする」とおぼえてください”

[Please remember that the *be* verb is not *desu*; it has the function of *equals*.] (My translation).

Shuei (2020) develop the *equals* function to demonstrate how learners may translate the following sentence: “They are in the library. 彼ら(彼女たち) = 図書館の中 [*karera (kanojotachi) = toshokan no naka*] [They = in the library]. (Shuei, 2020).

The explanation given is, 彼ら[彼女たち]は図書館の中にいます」と訳すことができます。[“*karera (kanojotachi) wa toshokan no naka ni imasu*” to *suru koto ga dekimasu*.] (They are in the library.) The information about people *being* in the library is missing in the *equals* statement. The Japanese *ni imasu*/ (locative particle + *be*-exist) must be provided by the learner. How they achieve this is, presumably, arrived at by relying on their world knowledge, because the other translation of *toshokan no naka* is simply ‘the middle (or inside of) the library’ without the locative and existence verb (*ni imasu*). Using this translation would result in an absurd representation: *They are the middle/inside of the library*. In this case, Shuei provides a fully translated sentence, but without clarifying the inferential nature of the translation. Additionally, information about existence and location must be inferred. However, note that there remains a serious conceptual, structural and procedural issue with the instruction that “the *be* verb is not *desu*” (Shuei, 2020). If learners acquire this rule, they may face significant difficulties as they develop.

The conclusion of this review is that the information provided to learners is primarily structural and informational. It aims to teach patterns at the sentence level. Although the notion of functions is employed, it refers to the function of an item within the overall structure. The major finding in this review is the lack of direct, reflective attention to the vital function of inferences in the translation process.

### Current Directions in Inference Pedagogy

Pedagogy in inferences may be categorised into two diverse fields that do not share methodologies, theories, or purposes: English language arts (henceforth, ELA) education, typically directed at the primary and lower secondary levels, and logical inferences for upper secondary and tertiary educational levels. Let us review these briefly before differentiating a third direction.

ELA research on inferences is critical because of the established correlation between inference drawing and reading skills (Kispal, 2008). In ELA pedagogy, Kispal (2008) defines inferencing as:

“the ability to make inferences is, in simple terms, the ability to use two or more pieces of information from a text in order to arrive at a third piece of information that is implicit” (p. 2).

The ELA focus aims to develop better pedagogies in reading at the primary and secondary levels. This literature has relevance for second-language pedagogy (Lee, 2013).

Many frameworks exist for categorising inferences in ELA research. Lee (2013) summarises several, which are shown in Table 1.

Table 1 *Types of inferencing*

Inference Types	Details
Logical	
Bridging	Forms connections in texts to attain coherence/cohesion
Causal	Forms connections in texts by means of cause-and-effect reasoning
Elaborative	Gap-filling; supplies extra information to the text to enrich mental representation of the text
Functional	
Explanations	Explains why things occur
Predictions	Predicts what is to come
Associations	Associates the textual meaning with world knowledge and supplies relevant information

Based on Lee (2013)

These types bear little resemblance to the various fields that focus on inductive, deductive and abductive inferences among other topics found in probability and logic, cognitive psychology and many others that are typically used in upper secondary and tertiary education. The two systems share conceptual similarities even if their targets and motivations differ, and as Mercier and Sperber (2017) argue, all reasoning involves forms of inferencing.

Let us compare the standard syllogism, consisting of the specific and general premises followed by a conclusion with Lee’s (2013) categories using an example from Stanovich (2009). He presents the following:

<b>Premise 1:</b>	All living things need water.	<i>general premise</i>
<b>Premise 2:</b>	Roses need water.	<i>specific premise</i>
	Therefore, roses are living things	<i>conclusion.</i> ”

(adapted from Stanovich, 2009, p. 121)

Logical inferencing is present in *therefore* which shows the coherence between the premises and conclusion. The specificity is elaborated in premise 2 which directs the mental representation from general living things onto roses in particular. The whole syllogism may be considered a form of functional explanation, and in the case of roses and water, implies predictions about real-life events. A similar claim may be made regarding functional associations. The point here is not to argue that Lee (2013) and formal logic are not mutually incompatible; these frameworks serve different communities of learners. But when another community has overlapping pedagogic requirements, as in the case of university English learners in Japan, the surface-level lack of incorporation of diverse systems potentially leads to a situation where differing learner needs have either had existing pedagogic systems ignored or not recognised. When I ask my students to *make inferences*, many check on their bilingual dictionaries to find, typically, the formal logical definitions only, thus hindering teaching in reading. Moreover, it is plausible that as the *university-level* students see the definition from formal logic, unreflectively, they assume that other forms of inferencing either do not apply, or more realistically, they do not become aware of them.

The issue is further complicated in recent work by Perfetti and Stafura (2015). The authors argue for a distinction between implicit meaning and inferences (Perfetti & Stafura, 2015). Figure 1 illustrates their tripartite framework.

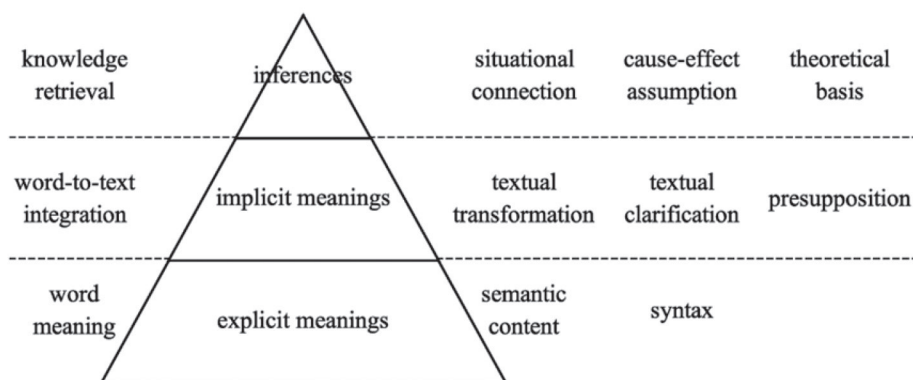


Figure 1. Adapted from Perfetti & Staffura (2015)

Explicit meanings include semantic content and a syntactic function to represent real-world meaning. This level is firmly bound to the text. The second level extends to what Kispal (2008) would call “coherence inferences” (p. 3); that is, including referentials such as *his* in *Peter begged his mother to let him go to the party* referring to *Peter* (Kispal, 2008, p. 3). Moreover, this form of inferencing, labelled ‘coherence’ in both Kispal (2008) and Lee (2013) may be considered cohesive inferences; indeed, Kispal even defines referential uses of pronouns as “cohesive devices (such as pronouns and connectives)” (Kispal, 2008, p. 8). Lee’s own example also uses a cohesive inference categorised as a coherent bridging logical inference: “*John showed Mum his school report. He was not allowed to play video games anymore* (italics in original, Lee, 2013, p. 720).

It is not necessary to discuss further the implications of Perfetti and Stafura's (2015) position on others or how other theorists have categorised the notion of inferences, only to note a further degree of conceptual confusion. Educators need to be aware of the terminological issues in the literature when selecting appropriate pedagogic material.

### **Non-Lexical Inference Pedagogy**

This review has highlighted a discrepancy in the instruction of English learners about the function of the *be*-verb, as it requires implicit inferential skills that are not provided to learners. Then, the review clarified the conceptual confusion that exists between the various pedagogic focuses in inference pedagogy at the primary/low secondary and the upper secondary/tertiary levels.

A possible third area was considered, one that may have a significant connection to this paper. The research field of inferencing and how it influences vocabulary building, reading comprehension and many other aspects of the reading and developmental processes is primarily focused on lexis; that is, at the semantic level. For example, Grabe (2008) notes many studies in the second-language reading context that investigate aspects of inferencing in reading comprehension and vocabulary, but none on syntactical inferencing. This exclusive focus (to my knowledge) on lexical inferencing is illustrated in the Japanese context by Kimura (2013) who studies how context influences inference drawing, Nakagawa (2006) who investigates morphological and contextual clues in English as a foreign language (EFL) lexical inferencing and Nahatame (2013) who researched the role of contextual constraint and local coherence on predictive inference generation. Little is known about Japanese EFL learners' beliefs about syntactic structures and how they mediate the production of English. This lacuna suggests a rich area of investigation. Certainly, the anecdotes described at the start of this paper indicate beliefs about English syntax that inhibit the development of better EFL skills.

### **This Study and Research Question**

A longitudinal study was instigated to investigate the efficacy of using games in EFL pedagogy to enhance metacognitive awareness of English syntactic patterns common in inference building. There are two major parts involved: creating the pedagogic instruments and testing them. This paper describes the first part. A second paper will present the results of the testing.

Two game types were selected for their "target feature essential[ness]" (Ellis, 2009, p. 231). This refers to the potentiality of a language activity to utilise particular lexical, syntactic, or functional structures. Ellis (2009) contrasts this with 'useful' (p. 231), a feature that is invoked when a structure may be used. Logic grid and Sudoku puzzles are typically done individually. These games are known to EFL educators, but as they are done individually, little is known about how they develop EFL learners' interlanguage structures or inferencing skills. As the language practice is done silently, learners may be "cognitive misers" and use intuitive cognitive processes, bypass algorithmic processes (Stanovich, 2009) and thereby fail to utilise linguistic structures altogether at worst or only be vaguely aware of them at best.



Pedagogy, therefore, must ensure that the activities:

1. are performed in pairs,
2. an informational gap exists between learners and
3. feature sufficient “target feature essential” (Ellis, 2009, p. 231) language.

This paper centres on the third of these, asking the question: *Do the game activities contain target feature essential language?*

## Methodology

This section begins by defending the epistemological, methodological and methods choices utilised in this research. It then describes how the dataset is to be analysed before explaining the production of the activities that were selected.

At this point, one major issue must be discussed. There is ample pedagogy in applied linguistics for presenting structural information about language (see the examples above). However, this project does not focus on applied linguistics. Rather, it is well established that learners’ beliefs dramatically shape their academic output (Bråten, 2016; Greene et al., 2018). The aphorism that *telling is not teaching* centres on this point. Although much is known regarding the form, meaning, usage and function of English (Halliday & Matthiessen, 2014; Larsen-Freeman, 2015; Quirk et al., 1985), little is known about how Japanese EFL learners’ epistemic cognition influences their beliefs about the nature of English and, subsequently, their attainment of English. Accordingly, an educational psychological perspective is adopted in this project. Effectively, this means that any activities selected to promote learning cannot focus on grammar (*i.e.*, structural) teaching and should instead incorporate implicit learning models. As such, Skehan’s (1998) task-based language teaching is appropriate. Skehan sets four criteria for a ‘task’, which are that, in tasks: “meaning is primary; there is a goal which needs to be worked towards; the activity is outcome-evaluated; [and] there is a real-world relationship” (p. 268).

Games that focus on logic and inferences were selected as the pedagogic instrument to develop learners’ implicit skills. This is due to the dual utility of logic games to satisfy Skehan’s (1998) criteria and promote implicit learning methods. In particular, the linguistic expressions involved in logical inferencing centre on modalities of possibility, certainty and negation. Additionally, propositional states are utilised and expressed using the copula. This linguistic focus targets the very same problems outlined above and is, therefore, congruous to the present purposes.

Following the defence of the epistemological position, this paper proceeds by outlining the methods of analysis, game board production and data collection.

### Epistemological Basis

A critical realist approach (Bhaskar, 2008) was adopted in which idiopathic data are incorporated within nomothetic structures. In this case, The dataset is derived from a single indi-

vidual (the author), which raises issues of generalisability and reliability. Critical realism accepts the idiopathic focus in constructivism but asserts that idiolects share structures which emerge from intra-individual units, which are generalisable (Bhaskar, 2008). Qualitative research findings, however, may be judged according to different standards from quantitative research, “in particular, a trustworthy account is one that is confirmable, credible, transferable and dependable” (Hammond & Wellington, 2013, p. 147) (p. 147). Because this study is an individual case study, issues centring on power relationships and the principle of no harm are avoided (Hammersley & Traianou, 2012).

### Analytic Method

Template analysis (King, 2012) is a method of qualitative data analysis that is appropriate within a critical realist methodology. It aims to “to define themes within the data and organise those themes into some type of structure to aid interpretation” (Brooks et al., 2015, p. 206). Furthermore, in template analysis, a thematic template is collated from the literature as an *a priori* set of potential themes, or codes, with which to initially test the dataset. The initial template is shown in Table 2.

Table 2 *Initial analytic template*

Inference Types	Details
Logical	
Bridging	Forms connections in texts to attain coherence
Causal bridging	Forms connections in texts by means of cause-and-effect reasoning
Elaborative	Gap-filling; supplies extra information to the text to enrich mental representation of the text
Functional	
Explanations	Explains why things occur
Predictions	Predicts what is to come
Associations	Associates the textual meaning with world knowledge and supplies relevant information
Formal logic	
Deduction	Use of existing principles to reveal inferences
Induction	Use of evidence to generate principles
Abduction	Seeks the most likely conclusions based on observations
Comprehension model	
Explicit meaning	Word meaning, syntactic meaning
Implicit meaning	Text-bound cohesion, discourse level coherence

The elements from Lee (2013) are identical to those in Table 1. To this, key concepts in formal logic are added (Hacking, 2001; Mercier & Sperber, 2017). Finally, Perfetti & Stafura’s (2015) word-to-text integration model completes the template.

The dataset is thematically analysed against the template. King (2012) cautions against a rigid approach in which dataset content is forced into the initial themes. Rather, the shape of the final template relies on a sensitivity to the potential meanings, which may not accord with the initial template.

### Game Board Production

A Sudoku (Figure 2) and a logic grid (Figure 3) game were prepared. The author created a beginner-level Sudoku game using the method described by wikiHow Staff (2022). There are nine numbers, and each was replaced with a lexical item to produce the final game board (see Figure 2). I named the game *Eidoku* to reflect the *Ei* in *Eigo*/English and the game's origin. The logic grid production method was my own and the final game board is shown in Figure 3.

			English	For		Your	Brain
		Is		Playing	Games		English
	For	English	Very	Brain		Games	
Brain			Is		Playing	Your	Games
	Is	For	Brain				
Playing		Your			Good		
		Brain	Playing	For	Very	English	
		Playing		Good		Very	For
		Very		Is	Your		Brain
						Brain	Playing

Figure 2. *Eidoku* game

#### Clues

- 1 Julie Jones loved her Canadian holiday.
- 2 The beaches in the Bahamas were lovely for Jody.
- 3 Ms Jeeves saw the Washington Monument.
- 4 Jenny Jackson enjoyed the Mexican Mayan temples very much.

	Jackie	Jenny	Jody	Julie	Bahamas	Canada	Mexico	United States
Jackie								
Jenny								
Jody								
Julie								
Bahamas								
Canada								
Mexico								
United States								
beaches								
monuments								
mountains								
temples								

Figure 3. *Logic Grid* game

### Data Collection

This project until this point is an individual case study. A think-aloud protocol was utilised as the author recorded himself during the gameplay for both games. The audio was transcribed, and the transcripts were checked for accuracy. The purpose of this stage of the research is to determine whether the transcripts contained “target feature essential” or “useful” language (Ellis, 2009, p. 231). Accordingly, non-essential data, such as pauses and suprasegmentals, were ignored. Additionally, because the text was not analysed for complete sentence structures, only for phrase-level structures that indicated inferential cohesion and coherence, sentence fragments were noted as such.

### Findings

The logic grid game was completed in sixteen minutes and twenty-eight seconds and generated 1,117 words. The *Eidoku* game took sixteen minutes and ten seconds to complete and resulted in 1,566 words. The games can be said to be roughly equal in terms of game play time and potential for language output.

The coding process generated 321 unique instances of language which accorded with the general theme of inferencing. From these, a final template was created containing five major types, which are further subdivided into seventeen categories. Table 3 presents this information.

Table 3 *Final template*

Categories	Sub-category	Example
1. Comprehension (45)	Negation (24)	Jody went ...→ Jody didn't go ...
	Rephrasing (21)	Jody went ...→ The person who went ...
2. Functional (14)	Explanations (9)	X → This means that Y is missing
	Prior knowledge (5)	Canadian → ...went to Canada
3. Deduction (94)	Reductive Cannot (22)	FOR cannot be in these columns
	Reductive Could not (8)	Jody could not have gone ...
	Reductive Must (4)	YOUR and GOOD must be in rows 2 or 3
	Possibility Could be (9)	GOOD could be in 3 spaces in box 6
	Deductive Can (4)	Only ENGLISH can be in box 4
4. Procedural (96)	Deductive Must (47)	GAMES must be in this space
	Gameplay (49)	I'm going to look at GOOD in box 4
	Summarising situation (16)	We still need to look at GOOD in box 4
	Continuation (8)	Okay, now .../ What about ...?
	Conclusion (5)	That finishes FOR
5. Propositional (72)	Intrapersonal comments (18)	I notice that .../ This FOR is interesting
	Printed information (41)	GAMES is already in box 2 and box 3
	Game state (31)	Column 2 now has 2 missing spaces

*The figures in brackets refer to the unique code count for each category and subcategory.*

Slightly more Procedural instances were recorded than Deduction ones. Most of these were about the gameplay itself. Within the Deduction category, overwhelmingly, the Deductive *Must* appeared almost half of the time. Propositional statements also featured widely as printed information was reviewed and as the gameplay state was updated. The Comprehension categories of Negation and Rephrasing were utilised frequently to confirm or deny states in the gameplay.

### Structural Language

Six forms of logical inferential structures were observed. These may be categorised into a sequence where *reductive*, inferences are noticed, leading to a narrower set of *possibilities*, prior to the final *deductive* stage. When the Propositional stage is included at the start of the sequence, a fuller four-stage model is observed. Figure 4 illustrates the sequence.

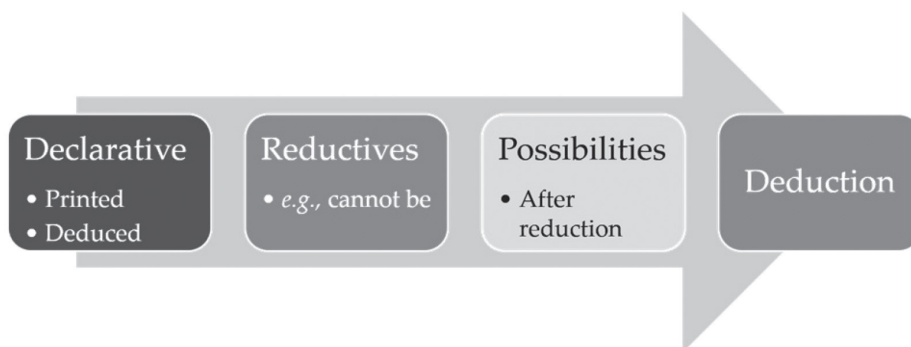


Figure 4. Process of deduction

An example of this sequence is as follows:

- |                                    |                       |
|------------------------------------|-----------------------|
| 1. Declarative (given information) | A <b>is</b> B.        |
| 2. Negation                        | A <b>cannot be</b> B. |
| 3. Possibility                     | A <b>could be</b> B.  |
| 4. Necessity                       | A <b>must be</b> B.   |

In addition to structures necessary to express inferences, many preliminary phrases were also evidenced. A remarkable point is that these phrases are both highly utilised in native English speaker discourse and often not comprehended by Japanese learners. They include;

- |                                           |                                         |
|-------------------------------------------|-----------------------------------------|
| 1. so                                     | for deduction                           |
| 2. now                                    | for continuation                        |
| 3. okay                                   | for possibility                         |
| 4. but                                    | for limitation                          |
| 5. We know that, which leaves, this means | before presenting products of deduction |

The findings, therefore, point to several critical aspects in inferencing that have utility in inference pedagogy. We continue by considering some implications of these.

## Discussion

The discussion begins by reiterating the research question for this stage in the overall project. Ellis's (2009) and Skehan's (1998) frameworks are used to analyse the findings before an evaluative summary is presented. Following a discussion about existing pedagogic frameworks such as Lee's (2013), the article ends by outlining the subsequent stage of this project.

### Analysis and Evaluation

#### *Language Feature Analysis*

The research question in this paper asked whether *the activities contained target feature essential language*. Considering Ellis's (2009) separation of naturally generated language into (1) natural, (2) useful and (3) essential, the dataset produced elements that are clearly *natural*. The single respondent is a native speaker of English. The issue of generalisability will be discussed later. Almost all the elements presented in this paper appear *useful* and comprise a set of structures appropriate to the completion of the task, while recognising that multiple choices exist for several of the expressions. For example, my idiolect prioritises *it could be* whereas another's may be *it might/may be*. Finally, language feature *essentialness* was demonstrated with elements such as *must be* and *cannot be*.

#### *Implicit Pedagogy*

Using Skehan's (1998) task-based language teaching as a framework, we may assess the likelihood of learning within an implicit pedagogy. The principle on *primacy of meaning* is

certainly upheld in the gameplay. There exists a *specific non-linguistic goal*, which is the completion of the game itself. The task can be *evaluated* based on the successful or unsuccessful outcome of the game. Finally, since the games are real-world games, carried out for entertainment purposes, the assessment that the games satisfy these criteria is possible.

### ***Evaluation***

In terms of implicit pedagogy, without conducting a controlled experiment, nothing definitive can be stated. However, when taken into consideration alongside the high volume of target language feature usefulness and essentialness, it is hypothesised that such pedagogy in inferences is likely to be availing. Testing this hypothesis is the main goal in the next stage of this investigation.

### ***Modifications to Theory***

Lee's (2013) classification of inferencing types does not include academic logic. Furthermore, Perfetti and Stafura (2015) contend that text-bound cohesion and coherence are not forms of inferencing. In terms of the activities discussed in this paper, it seems clear that a more encompassing view of inferencing is required. Such work is beyond the scope of this paper, but the information here may help inform some of the future directions.

### ***Limitations***

The entire dataset was generated by a single person (the author). As such, there are issues of idiosyncrasy in the selection of deductive, procedural and functional linguistic elements. Some of the elements may seem beyond the capabilities of lower-level learners. For example, *could be* requires (or seems to require) prior knowledge of *can* as a verb and its past formation. However, this belief may be a product of explicit learning methods rather than anything inherently complex in the linguistic elements themselves. As Bertolog (2001) noted, there are many aspects in the language learning situation that impact learnability, not only linguistic structural ones. Smiley (2006) argued that many structural issues could be replaced with the notion of semantic distance, proposing that difficulties lie not mainly with structure but with meaning separation from the learner. These issues need further work.

### ***Future Work***

This paper outlines a proof-of-concept, that the pedagogy of inferencing in EFL learners may be effectively conducted using targeted activities while maintaining implicit learning modes of instruction. At this stage, I evaluate this claim as being realistic. Yet, much still needs to be done before the claim can gain theoretical stability.

The next stage is to conduct a controlled experiment that tests participants' inferential abilities before and after a pedagogic intervention. Ideally, several researchers will be recruited to extend the validity and generalisability of the project. Fundamentally, language learning should be concerned with meaning-making, and only incidentally with linguistic structure. Many learners are intrinsically motivated to complete logic games; hopefully, they can do so while simultaneously developing their EFL skills.

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