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Learning to Hypothesize with Confidence through Sudoku Game Play

A main objective in teaching English as a foreign language (EFL) is to enable students to communicate effectively in many situations and contexts. This involves being able to control a wide range of language functions, which are how speakers use language for requesting, congratulating, apologizing, complaining, consoling, and promising, among many other functions. To express these *language functions* appropriately requires an often subtle selection of particular words and verb tenses, as well as special intonation. While we easily manage language functions in our native language, it is far more difficult to do so in our second language, where the result is often embarrassing mistakes or a breakdown in communication. Therefore, introducing learners to features of English that are essential to express language functions is important, even for less advanced learners who also must venture out into real-world English. I was therefore relieved when I found that the popular game of *Sudoku* offers an ideal, authentic context for incorporating modal verbs and colloquial expressions to teach the useful language functions known as *confident hypothesizing* and making *logical conclusions*.

Modals and language functions

The modal verb *must* is typically associated with a command, but it also has other important possibilities for communication. Most EFL textbooks restrict the function of the auxiliary *must* to circumstances of authority and obligation with examples such as "What a terrible cough—you *must* see the doctor," or "You *must* have a visa to enter the country," giving this modal a negative and foreboding undertone. Of course, *must* is important in these circumstances, but this is not its only function. In fact, *must* and its associates *have to* and *can't* lead a much more elegant life, beyond gloom and doom, when we use them for the function of *confident hypothesizing*, in phrases such as:

- "It *must* be love!"
- "This *has to* be a dream!"
- "He *can't* be real!"

The modal *could* also has a hypothesizing function beyond its typical uses—to refer to past abilities or make polite requests. For example, "Oh no… she *could* be disappointed again!" shows *could* in its function of hypothesizing. These modals are thus extremely useful chunks of English that learners need to make logical hypotheses and conclusions and to participate in meaningful conversation.

Sudoku: The importance of game play

Despite its Japanese name, Sudoku was invented in 1979 by an American architect, Howard Garns (Pegg 2005; Delahaye 2006). After gaining popularity in Japan in the 1980s, where it acquired its now popular name, Sudoku has become a hit worldwide. In Japanese, Sudoku means "the number must occur only once," a name that nicely conveys the rules of the game. Sudoku is based on the *Latin square*, a three-by-three matrix of 3 rows and 3 columns. The Latin square's 9 cells are filled in with a number or symbol that must appear only once per row and once per column. Sudoku is composed of 9 of these three-by-three matrices, and the goal is to make sure that the numbers 1 to 9 appear only once per row, once per column, and once per each three-by-three matrix (see Figure 1). These rules are explained in more detail below as they can be used as part of this Sudoku lesson. What is important for any math-phobic EFL teachers to know is that Sudoku is not a game of mathematical wizardry but is a game of common sense and logic, which all good teachers have.

And as all good teachers know, game play lowers learners' affective barriers to foreign language learning (Kim 1995). Well-designed, language-focused game play provides students an opportunity to use target forms in a meaningful way and motivates them to use the functional forms we are trying to teach (Wright, Betteridge, and Buckby 2006). In fact, targeted game play is not mere playtime but should be an intricate part of the EFL syllabus (Byrne 1987; Hadfield 1997). This is especially true in the monolingual context in which I teach, where students only have two to four hours of English per week.

As mentioned earlier, it is quite rare for students to encounter the modals *must, have to, can't, could,* and *couldn't* as auxiliaries for confident hypothesizing and making logical conclusions, and it is even rarer for learners to have a chance to use these modals in these functions. Sudoku offers learners a context to play their way to competent, confident hypothesizing and concluding, providing them a chance to appreciate and apply these modals in a highly meaningful and enjoyable context.

Pre-game preparation

1. The rules

Even if your students are already familiar with Sudoku, explaining the rules can become part of the lesson, giving your learners a chance to both listen for and give instructions. The Sudoku game in Figure 1 has the following simple rules (keywords are in italics):

- First of all, the magic number of Sudoku is 9.
- The entire board is composed of 9 *three-by-three sections*, separated by bold lines.
- Each *section* has 9 *cells*, 3 *rows*, and 3 *columns*.
- The entire board has 81 *cells*, with 9 *cells* per *horizontal row* and 9 *cells* per *vertical column*, each spanning three *sections*.
- Each of the *numbers from 1 to 9* can only *appear once* in each *section*, in each *row*, and in each *column*.

Depending on the level of your learners, you can present these rules on a handout and explain them yourself or, better yet, select five students and have each one read and then teach one of the rules. The five students can clarify the rules by pointing to the Sudoku board and using prompts such as *see*, *here*, *here and here*, for example, and *if you look*. These prompts may be written near the board to help these Sudoku teachers. Encourage those who are not familiar with the game to ask for further clarifications from the five student teachers. Finally, agree as a class on how to refer to the sections, rows, and columns. It will help to number the sections from 1 to 9. For example, if the sections are numbered left to right and from top to bottom, the two

shaded sections in Figure 1 could be called Section 1 and Section 9. To play the game, students will need to use the ordinal numbers 1 to 9, as well as expressions like "fifth column," "third row," etc., so also review ordinal numbers and suggest that learners write down a list of useful expressions.

		1	9		8	2		
8								4
	6		4	7	3		9	
		4	2		5	6		
				1				
		3	7		6			
	1		6	5	4		3	
4								6
		2	3		7	9		

Figure 1: Sample Sudoku Game (Solution appears at end of article)

2. Preparing the Sudoku game board

You can either draw a Sudoku game board like the one in Figure 1 on the classroom chalkboard right before the lesson or bring in a game board on a big sheet of paper, making sure it is large enough for all the students to see.

3. Vocabulary handout

To help learners play the game smoothly, prepare a handout with the following expressions that they will need during the game (n stands for any number 1 to 9):

- this section/row/column/cell…
- there's already a/an *n* in…
- there's a/an *n* missing…
- the only missing numbers are…
- above/below the…
- on the right/left…
- here…
- So…
- But right now, I don't know…

And of course, the handout should list the following basic expressions for confident hypothesizing and concluding:

- *Must:* "It must be a/an…"
  "*n* must go here…"
- *Can't:* "It can't be a/an…"
- *Has to:* "It has to be a/an…"
- *Could:* "It could be a/an or a/an…"
- Combinations: "It can't be a/an *n*…but it could be a/an *n*."

Students should understand that these are the basic grammatical language units used for hypothesizing and concluding. Also explain that, contrary to its dark voice of prohibition when *must* functions to express obligation, in its function for hypothesizing confidently, we usually use *must not* rather than the contracted form *mustn't* to emphasize our logical disbelief: "This *must not* be the right restaurant—it's too expensive." Likewise, *can't* often loses its association with prohibition and inability when used, usually in its contracted form, in confident hypothesizing: "This *can't* be the right address—there is nobody home."

In addition, in its function for confident hypothesizing, *has to* remains in the affirmative form ("He *has* to study a lot—look at his wonderful grades!"), which is pragmatically very different from the *has to* of authority: "He *has to* study if he wants to pass the exam."

4. Game cards

On sturdy paper, prepare the following game cards:

(a) nine *Number Cards* numbered from 1 to 9.

(b) three *Location Cards*, the first labeled *Section*, the second labeled *Column*, and the third labeled Row.

(c) six *Colloquial Expression Cards* that contain the following colloquial expressions:

- For sure…
- There's no way…
- I bet…
- It certainly…
- I'm sure…
- Wanna bet that…?

These six colloquial expressions are seldom found in textbooks but are very much a part of real-world confident hypothesizing and concluding. Therefore, after you have translated the colloquial expressions into the students' native language, show students the examples in Table 1 to illustrate how the expressions can (1) stand alone to express confident conclusions, and (2) join with the constructions on the vocabulary handout.

Table 1: Useful Colloquial Expressions for Confident Hypothesizing and Concluding

For sure	1. For sure he can't be poor—look at his car! 2. For sure a 2 doesn't go there because there's already a 2 in the same row. *
There's no way	1. There's no way he knows about the surprise party—I was very careful! 2. There's no way a 3 can go there because there's already a 3 in the section. *
I bet	1. I bet he'll be surprised when he finds out about this party! 2. I bet a 4 could go here because that's the only missing number in this; column. *
It certainly	1. It certainly is going to be a hot day today! 2. It certainly has to be a 9 here because it can't go in any other place in the section. *
I'm sure	1. I'm sure he's her brother—they look identical! 2. I'm sure an 8 must go here because that would complete the row. *
Wanna bet that	1. Wanna bet that he's been gardening? Look at his shoes! 2. Wanna bet that a 2 has to go here? It's the only number missing in this column. *

*The second example shows how these expressions could be used in a Sudoku game.

Playing the game: Language-focused game play

Once the basic Sudoku rules have been explained you are ready to play!

Step 1

Divide the class into two teams (team 1 and team 2)

Step 2

A player from team 1 draws the following game cards:

- 3 Number Cards
- 1 Location Card
- 2 Colloquial Expression Cards

Step 3

The player from team 1 associates one of the three Number Cards with the selected Location Card. For example, if the Location Card says *Section* and the Number Cards contain 1, 3, and 5, the player may choose to associate the number 1 with *Section*. Team 1 then works with Section 1 on the game board and team members discuss how the numbers 3 and 5 fit into that section. Using the sample game in Figure 1, if the student had drawn the two colloquial expressions *For sure* and *I bet*, the team members would think aloud and could say something like "For sure a 3 can't go in the third row because there's already a 3 in the third row in section 2," or "I bet a 3 can't go in this third column because there is already a 3 in the third column in section 4," or "It could go here and here (pointing to the cells above the 6 and above and below the 8), but right now I don't know where 3 could go in section 1."

As the numbers get filled in, students thinking aloud might begin to generate "It certainly can't be an 8 here because there's already an 8 here and here (indicating respective locations to sustain their hypotheses), so it must go here," or "Since the only missing numbers are 2 and 4, and for sure 2 can't go here, then it must be a 4 here."

After team 1 has successfully entered their numbers, team 2 takes their turn. Depending on the level of your learners and how competitive you want the game to be, each correct use of the basic expressions of confident hypothesizing or concluding on the vocabulary handout may receive different points than the successful use of expressions on the colloquial expression game cards.

Variations: Expressions of challenge

A nice variation to the game is the use of *Challenge Cards*. After the members of team 1 have entered their numbers or justified why they could not do so, team 2 may choose a Challenge Card and ask a member of team 1 to answer a *challenge question*. Some Challenge Card questions could be:

- Tell us about the number *n* in Section 2.
- Why can't this be a/an *n*?
- What could be in this cell (specifying orally or by pointing)?
- Why can't *n* go here?

These Challenge Cards should be on heavy colored bond paper (red or a culturally significant color) and either drawn from a pile of cards or stuck on the wall next to the Sudoku board. For example, and again referring to Figure 1, an opponent points to the cell between the numbers 4 and 7 in Section 8 and challenges with "And why can't 3 go here?" (The answer is twofold: not only is there already a 3 in that section, but there is also a 3 in the same column.) This is a very simple challenge, but as learners get into the game, the challenges will get more difficult. Points can be given or even deducted, depending on whether the challenge is met or not.

Conclusion

Playing Sudoku provides a meaningful context for many learners to get actively involved in generating, at a very high frequency, the functional language of confident hypothesizing and concluding. Likewise, the colloquial expressions and language of challenge come so naturally in the context of a game that one forgets how highly form-focused the language of play actually is. Given the natural need for using these language forms repeatedly to succeed in this game, learners become fluent in relevant communication skills in a very short time. And the popularity of Sudoku gives teachers access to an endless source of games, of varying levels of difficulty. What better way to get our learners hypothesizing, concluding, and challenging confidently? It has to be through a game!

Solution to game in Figure 1

3	4	1	9	6	8	2	7	5
8	9	7	5	2	1	3	6	4
2	6	5	4	7	3	1	9	8
9	8	4	2	3	5	6	1	7
5	7	6	8	1	9	4	2	3
1	2	3	7	4	6	5	8	9
7	1	9	6	5	4	8	3	2
4	3	8	1	9	2	7	5	6
6	5	2	3	8	7	9	4	1

Note: For free Sudoku games (with answers), see www.krazydad.com/sudoku.

References

Byrne, D. 1987. *Teaching oral English*. 2nd ed. London: Longman.

Delahaye, J. P. 2006. The science behind Sudoku. *Scientific American* 294 (6), 80–87.

Hadfield, J. 1997. *Intermediate communication games: A collection of games and activities for low to mid-intermediate students of English*. Harlow, UK: Longman.

Kim, L. S. 1995. Creative games for the language class. *English Teaching Forum* 33 (1): 35–36.

Pegg, E., Jr. 2005. Math games: Sudoku variations. Washington, DC: Mathematical Association of America. www.maa.org/editorial/mathgames/mathgames_09_05_05.html.

Wright, A., Betteridge, D., and Buckby, M. 2006. *Games for language learning*. 3rd ed. Cambridge: Cambridge University Press.

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