1		R2	What do you think? How many towers can you make when you make them four high?
2		Michelle:	I don't know yet
3		Milin:	I think sixteen
4		R2	Why do you think sixteen?
5		Milin:	Well it works like this, before, I don't know, I can't remember that, before we found out that for blocks of two you have to multiply two from the first tower that's two times two so second one is four then two times four is eight times one more would be times two would be sixteen.
6		R2	What do you think Michelle is that reasonable?
7		Michelle I:	I guess.
8		R2	Not sure huh? You have to convince Michelle. Is there a way you could convince her that that works?
9		Milin:	I Could build blocks.
10		R2	That might help her you know, to show her how that works. I didn't understand How many can you make when they are one high?
11		Milin:	Two
12		R2	Show me.

Description: Building Towers Selecting from 2 colors for Guess My Tower, Clip Three of Five: Milin introduces an inductive argument	Transcriber(s): Sran, Manjit
Parent Tape: Guess My Tower – Michelle and Milin View	Verifier(s): Liberman, Melissa
Location: Harding Elementary School	Date Transcribed: Spring 2009
Researcher: Professor Carolyn Maher	Page: 2 of 11

13		Milin:	Two
14		R2	One high two. What happens when they are two high?
15		Milin:	Two high, two
16		R2	What did you do you put a red on red and yellow on yellow? What are you doing now?
17		Milin:	Red on yellow and yellow on red.
18		R2	It would help me if you left you left the first ones alone that would help Michelle and me understand what you are doing so tell me again you started with a yellow and you started with a red right?
19		Milin:	Then this
20		R2	Here's the yellow This is the one with bottom yellow, what did you do to it? No the one with the bottom yellow what did you do to it?
21		Milin:	I put another yellow on top of it
22		R2	You put another yellow on top of this and got this I could see that. what else
23		Milin:	I put a red on top of that one and a yellow on top of this one
24		R2	You put a red on top of this one. oh so on this yellow one you put

25		Michelle:	A yellow and a red
26		R2	Oh and on this
27		Michelle I:	A yellow and a red too
28		R2	Oh. So?
29		Milin:	Number three we already found out that would be eight.
30		R2	How is it going to be eight? Do you see how it is going to be eight Michelle can you tell me?
31		Milin:	Well it was –
32		R2	Tell me what Milin is doing here though what would you now Milin?
33		Milin:	With this I would put a another red
34		R2	Let's see on the red one you would put another red
35		Milin:	On yellow one-
36		R2	Lets worry about the red on the red one you would put a red. Okay let's leave it here
37		R2	What are you doing Michelle on the red one he put a red what are you doing with that red one?
38		Michelle I:	We could add a yellow one to that

39		R2	This red one if you are making it three put a red on it
40		Michelle I:	Yeah and put a yellow on top of it
41		R2	Oh why are you doing that? Why does that work?
42		Michelle I:	I don't know
43		Milin:	Just works on top of that we could instead of that we can put yellow in between.
44		Michelle I:	You could put yellow on the bottom too.
45		R2	Now wait wait. Where does that come from where does that one come from? I am getting confused
46		Milin:	Okay, This one comes from this
47		Michelle I:	This one comes from that you can put a red on top of it.
48		R2	Oh
49		Milin:	These two And this one
50		R2	No These go with this
51		Milin:	This and this comes from this and this comes from this and this comes from this.
52		Michelle I:	And these come from this
53		R2	Okay, but how come this one has two and this only has one?

54		**Milin:**	Well there would be two for this one also.
55		**R2**	What is the other one for this one? I don't understand
56		**Milin:**	Put yellow on here
57		**R2**	See what he did?
58		**Michelle I:**	No
59		**R2**	Michelle doesn't know what you did
60		**Milin:**	Take these two off Okay? There is only two colors in all. These two are same thing as this right and if you put this to make it to a three you put this on this and to make this one a three you put a red on this and that wouldn't be a duplicate.
61		**R2**	So you are telling me when you have this one. To make it one higher you can make it one higher by putting a red on it or by putting a yellow on it?
62		**Milin:**	Yes.
63		**R2**	Does that make sense?
64		**Michelle I:**	Yes.
65		**R2**	Okay, now I see how you got these. But you only have four but you told me there is going to be more than four.

66		Milin:	Yeah off of this you put-
67		Michelle I:	three yellows
68		Milin:	-three yellows
69		R2	You do what Michelle?
70		Michelle I:	You could add yellow on from there and you could also add red on. See, I understand but like its everything times two
71		R2	What? Tell me.
72		Michelle I:	Like from here from the two if you times by two you got fours
73		R2	Why is it that? But why is it four? I can see it is four. I can see you got eight. But can you tell me why that works?
74		Michelle I:	Because there is two different colors
75		Milin:	Yeah.
76		R2	Right I know that
77		Milin:	Every single time you have two off of each one by putting different color.
78		Michelle I:	I think you times it by the height no wait, that didn't work. No, never mind.
79		Milin:	See these two you multiply that by two you get these two or

			you could-
80		Michelle I:	You multiply by two because there is two colors of them and you could add two colors on top of each one.
81		R2	Oh I see, so in other words if I start with this yellow by making it higher the only way I can make it higher was either to put a red that's one choice-
82		Michelle I:	Yeah
83		R2	-or a yellow that's a second choice-
84		Michelle I:	Yeah
85		R2	-so that's how I get two from this one
86		Michelle I:	Yeah
87		R2	and then I get two from this one
88		Michelle I:	Yeah and all the other we got eight out of that so because you could add the, this one is hard to explain.
89		R2	Let me understand this one let me see now this one here I am a little confused here which is the one that came from this
90		Milin:	This and this
91		R2	But that doesn't make sense to me cause this one has yellow on the bottom and a red on the next one right?

92		Michelle I:	it is confusing
93		R2	Does it make sense to you? You should have a yellow and a red.
94		Michelle I:	This this should be like this yellow/red/and then yellow. Cause then you will have from the yellow and the red and you already added the red
95		R2	Oh that makes sense.
96		Michelle I:	And you have two yellows you added the yellow and you added the red cause those are the two colors. From this you added a red and a yellow and From this you added a red and a yellow.
97		R2	Okay so now I see how it works okay so now I see then I should be able to know how many I would have if they are four high and how to make them.
98		Milin:	Yeah.
99		Michelle I:	This is a lot simpler than the last time you explained it.
100		R2	Is it? Why?
101		Michelle I:	Because last time we like we didn't do it like this it is easier to explain it when you have it like this even though we didn't like I think the answer is sixteen because eight times two is sixteen from every one you from every one of these you add on two.

102		R2	Oh so you get the other two always. That's neat. You think you can explain it to the class? You think both of you can build these and explain it to the class?
103		Michelle I:	Probably
104		R2	May be even go to five that would be neat. Okay why don't you Get ready for that would be very helpful
105		Milin:	Go to five?
106		R2	Yeah go to four and then go to five. And Show me if it still works. Don't you think the class would like to know this?
107		Milin:	Let's see Who else knows this? Stephanie knows this. Because we found this out remember?
108		R2	Stephanie knows this? I don't know
109		Milin:	She should.
110		R2	We could ask her to come over here and look. We could invite her over. Stephanie you want to come over here and Matt.
111		Milin:	If she remembers this from last year
112		R2	Michelle and Milin showed me something really neat she said that you know this and I don't know
113		Milin:	I don't know about Matt but-

114		R2	May be Matt wants to know.
115		**Stephanie**	Is that the two times the number thing?
116		**Milin:**	Yeah
117		**Stephanie**	That's what I was trying to explain to Matt
118		R2	Michelle, why don't you, why don't you do it because Milin just explained it Michelle let's see if Michelle knows it, Okay? Milin just explained it to me too.
119		**Michelle I:**	For this one you can add a red on top of it and yellow because there's two colors and this one you could add red and yellow so its there is I don't know how to explain it
120		**Matt**	Steph, that's what we were that's what we were its like a sort of like a family tree
121		R2	A tree?
122		**Stephanie**	See I knew I was right I knew-
123		**Matt**	See, you add a yellow or red on top of that-
124		**Michelle I:**	And then it's here too and here and that how you find-
125		**Matt**	Like that, like that and that and that and that
126		R2	That's neat! I wonder if you could make it into a tree that would be a nice way to do it too. It will be really nice to do a tree who would like to make a tree for this? Cause I like you

			to share it with the rest of the class.
127		**Stephanie**	I will do it I guess
128		**R2**	That's wonderful! Milin, see you are helping people remember. Is there anyone else that was working on this last time?