10.5 TRANSCRIPT – MILIN'S FIRST INDIVIDUAL TASK-BASED INTERVIEW ON 2/7/92

No Reds
Group A

One Red cube
Group C

Two Red cubes
Group E

No Yellows
Group B

One Yellow cube
Group D

Two Yellow cubes
Group F

Two Red cubes separated
Group G

Two Yellow cubes separated
Group H

Towers from Group G and Group H rearranged to form

Group I
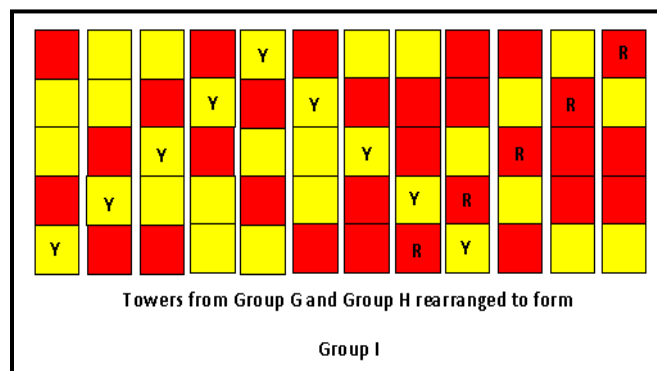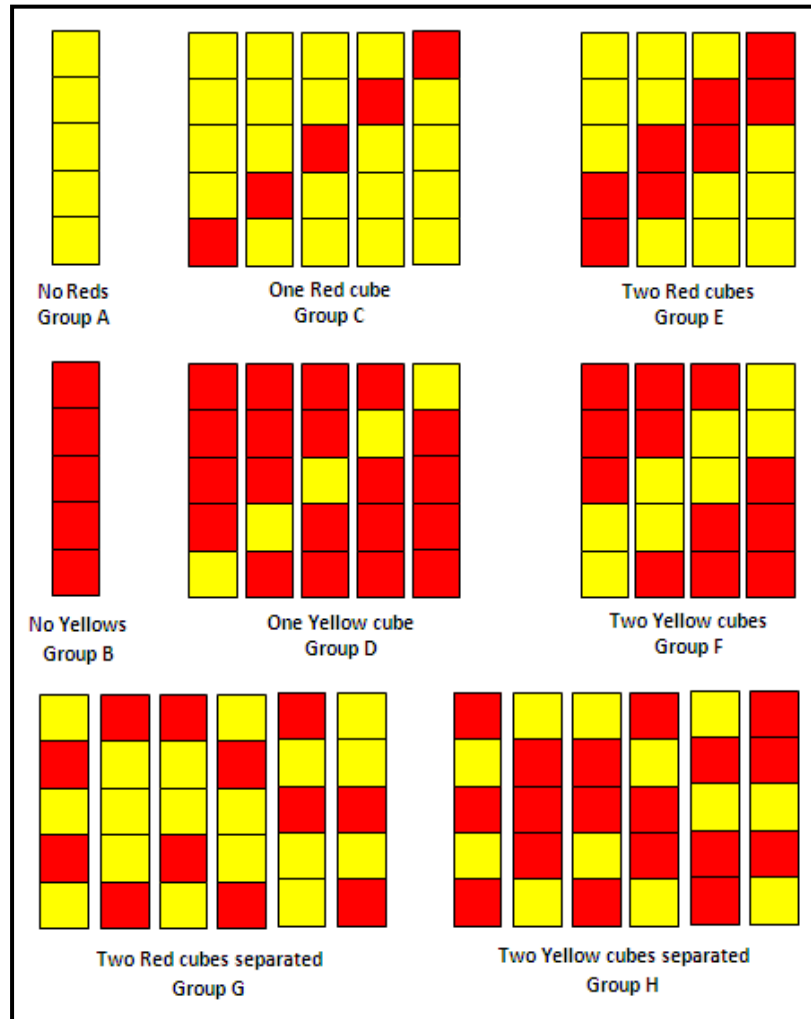
Line	Time	Name	Transcript
1.	00:00:14	R1:	What did you think about the activity yesterday? Did you enjoy it?
2.		Milin:	Yes.
3.		R1:	Why?
4.		Milin:	Um… before we had something like this, in second grade
5.		R1:	Second grade?
6.		Milin:	I don't know. Second or third. I don't know.
7.		R1:	Yeah. What do you mean, "something like this"?
8.		Milin:	'Cause we had to urn build them and ... I don't know which grade but ... we had to build them so it was much easier this time.
9.		R1:	Okay, so this time was easier because you'd done it before? When you did it before was it exactly the same, or do you remember?
10.		Milin:	I don't remember. (*He chuckles*)
11.		R1:	You really don't remember, but you felt like you were sort of doing it... again.
12.	00:00:52	Milin:	Yeah.
13.		Mrs. O:	Built towers...
14.		Milin:	Yeah.
15.		R1:	And how did that make it easier yesterday?
16.	00:05:57	Milin:	Because um when ... because last time I didn't um go for about the amount, but this time I thought it would be around 30 or 40, so ...
17.	00:01:12	R1:	Oh, because you remembered from
18.	00:01:15	Milin:	Yeah
19.		R1:	Last time that there were more than you had thought or something, and so you kept trying. Oh, what, how did

Line	Time	Name	Transcript
			you solve this problem?
20.		**Milin:**	Um, when Michael and I kept on um building them and putting another one exactly like that but different colors ...
21.	00:01:33	**R1:**	What do you mean by that?
22.		**Milin:**	Cause like Michael and um Paul did ... we um, we looked at the colors and all the yellows turned to reds, and all the reds turned to yellows ...
23.		**R1:**	Show me. Maybe we could use some Unifix Cubes and show me what you mean as an example for what you did.
24.	00:01:55	**Milin:**	Like if you take this for example. (*YYYRR)*
25.		**R1:**	Uh huh
26.		**Milin:**	We did this (*Milin refers to towers YYYRR and RRRYY)* and now we have this. All of these yellows turned to these reds, and all these two reds turned to these two yellows.
27.		**R1:**	Oh, I see. Is that always a way you worked? I mean, did that always work?
28.		**Milin:**	Yeah, uh huh. Because see if ... if we had something like ... this (*He builds YRRYY*) we would always check to see if it would be like this (*he compares YRRYY to YYYRR and RRRYY)…* or if this was a red or something.
29.		**R1:**	Uh huh.
30.		**Milin:**	And then we, (*he builds tower RYYRR)* now, it would be like this. And they'll be the same okay ... and these two, so we put it like this (*he groups all four towers together)*and every time we see if one goes to that group and then either just put it away if it does, and um, if it doesn't then we got a new group.
31.	00:03:13	**R1:**	New group? What do you mean by new group?
32.	00:03:15	**Milin:**	Because see, these two are a group because this turns into this ...(*He compares tower YRRYY and RYYRR and points to opposite red and yellow positions)* and this turns into this.

Line	Time	Name	Transcript
33.	00:03:19	R1:	Okay, so they came in two's always.
34.		Milin:	Yeah.
35.		R1:	And any one you found always would have a partner
36.		Milin:	Yeah.
37.		R1:	… or whatever?
38.		Milin:	Yes, Uh huh.
39.		R1:	And that's always going to be true?
40.		Milin:	Uh huh.
41.		R1:	That's really interesting. Um, how many towers did you find?
42.	00:03:37	Milin:	Thirty-two. *(Confidently)*
43.		R1:	You think you found them all?
44.		Milin:	Yeah.
45.		R1:	Why?
46.		Milin:	Because as you guys explained yesterday. Also, because um we did all that towers and going up one …
47.		R1:	What, what do you mean? Oh, I don't know. That was when Dr. Maher was up there and you all were talking together.
48.	00:03:56	Milin:	Yeah.
49.	00:03:57	R1:	Can you help me remember what that was all about?
50.		Milin:	That was about seeing if we had all of them.
51.		R1:	Oh, and how did that help us see that we had all of them?
52.		Milin:	Because most people thought that we had 32 but then some people thought that we had 35 and 34 but then they found extras and then she went up and we found it like

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			this. All the ... starting from the reds (*He points to the bottom two reds on tower YYYRR)*one red then another red on the next floor (*he points to imaginary red cube on the second floor of tower RRRYY)* so they'll be four, five reds.
53.		R1:	Can you show me what you're talking about there? Let's keep these. (*R1 puts YRRYY, RYYRR, YYYRR and RRRYY aside, Milin builds YYYYR)* Maybe because these were your pairs that you were showing me for examples and I want to know what you're talking about.
54.	00:04:40	Milin:	*Sighs* Like this and then three... (*He builds YYYRY)* See this goes in the staircase (*he compares YYYRY and YYYYR and points out the beginning of the staircase pattern)* and keeps on going
55.		R1:	Oh.
56.		Milin:	To the third, and forth and fifth. (*He points to imaginary red cube in the third, fourth, and fifth position.)*
57.		R1:	How many would there be?
58.		Milin:	Five!
59.		R1:	Why?
60.		Milin:	Because when you keep on going up that would be five, five of them.
61.		R1:	Why can't there be more?
62.	00:05:08	Milin:	Because there's only five of these (*he points to YYYRY with five cubes in it),* so one on each block.
63.	00:05:13	R1:	Oh, Okay. And so that means then with one red block (*R1 points to the bottom red cube on YYYYR)*
64.		Milin:	Yeah.
65.		R1:	There's how many?
66.		Milin:	On one red block um there's four yellows. On another red block on the second floor there's three yellows above it. (*He refers to YYYRY)*

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67.		R1:	How many yellows all together though, in that tower?
68.		Milin:	Four.
69.		R1:	Oh.
70.		Milin:	Always four yellows if you're talking about one, but if you're talking about two they'll be three yellows.
71.	00:05:38	R1:	Oh, like
72.		Milin:	Like on this, I mean
73.		R1:	Which one over here has ... *(She refers to the first four she set aside)*
74.		Milin:	This ... *(Milin points to YYYRR)*
75.		R1:	This one *(she points YYYRR)* and that one *(she points to YRRYY).* Yeah, yeah ... I see. So this one over here has *(she points to YYYYR)*... I mean with two reds and three yellows *(she points to YRRYY & YYYRR)*and over here is one red and ... *(she points to YYYRY and YYYYR)*
76.		R1:	Four yellows. And how many were there that had one red and four yellows?
77.	00:05:59	Milin:	Five.
78.	00:06:01	R1:	Yeah. Okay, how many were there that had one yellow and four reds?
79.	00:06:07	Milin:	One yellow and four reds?
80.		R1:	Uh huh.
81.		Milin:	Um ... five.
82.		R1:	Why?
83.		Milin:	Because if you had this *(he points to YYYYR)* then you could do the same thing but they'll be reds on this and yellows on this. Kind of like what I was showing you on these two *(he points to YYYRR & RRRYY)* and all that.
84.		R1:	Oh. Because of those ...

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85.		**Milin:**	Yeah.
86.		**R1:**	Those pair things you were talking about. Oh, I see. And so this was part of how we figured out how many there were all together?
87.	00:06:32	**Milin:**	Uh huh.
88.		**R1:**	Do you remember and, so how many were there that had one red and four yellows? (*She points to YYYYR*)
89.		**Milin:**	Five.
90.		**R1:**	Maybe we should write these things down. I'm having a hard time remembering all these numbers.
91.		**Mrs. O**	Maybe we could show them too and then that'll help.
92.		**R1:**	Yeah.
93.		**Milin:**	Okay then they'll ... (*He tries to take YRRYY from the first pile set aside*)
94.	00:06:49	**R1:**	And let's keep these here (*she points to others in the original pile, he puts it back*), okay?
95.	00:06:53	**Milin:**	(*He builds YYRYY- Thinking aloud*)Yellows and reds and ... See, it's like a staircase.
96.		**R1:**	Uh huh. Make the whole staircase because sometimes I have a hard time imagining.
97.		**Milin:**	(*Thinking aloud*) Well... take this one ... I guess we're going to have to make another staircase. (*He builds YRYYY -Meta-analysis*)
98.		**R1:**	Oh, I think I really have a hard time imagining.
99.		**Milin:**	(*He builds RYYYY*) See and then um ...
100.		**R1:**	Oh, I see
101.		**Milin:**	and then the yellows would do the same thing but um…
102.		**R1:**	And the yeah ... and so these would be (*R1 refers to all*

Line	Time	Name	Transcript
			the red cubes in the downward pattern of Group C) ... for the other…
103.	00:07:47	**Milin:**	Yeah. Same thing because see ... you know ... same thing as this (*he refers to the staircase pattern of Group C)* see this has a partner like one yellow and four reds (*he points to RYYYY)* right here going down. This has the same thing (*he points to YRYYY)* but it's going the other way.
104.		**R1:**	*(She nods and says, "Uh huh" throughout his explanation)* Uh huh.
105.		**Milin:**	This is in the second floor. (*He points to YYRYY)*
106.		**R1:**	Uh huh.
107.		**Milin:**	They all have partners (*he refers to Group C),* so this would probably be ten. (*Planning ahead - he refers to the un-built Group D)*
108.		**R1:**	Yeah. That's what I'd really would like for us to keep a record of. Maybe you could write down how many there were that had one red and four yellows (*she points to RYYYY),* and one yellow and four reds. Here's a pen you can use.
109.	00:08:21	**Milin:**	Um ...(*he writes "1 yellow and 4 reds are 5")* See, because these five (*refers to Group B)* and four reds go like that so they'll all have something ... a partner so then that'll be one red (*he writes below the first line "1 red and 4 yellows are 5"*)and ... see yellows are five and reds are five because you can't go any more. (*He points to Group C)*
110.	00:09:35	**R1:**	*(R1 nods and says, "Uh huh" throughout his explanation)* Yeah, okay. And then after you did one yellow and four reds, and one red and four yellows, then what other possibilities were there?
111.		**Milin:**	Um, there were ones that if you could use two of them.
112.		**R1:**	How many of those were there?
113.		**Milin:**	Um four ... four of each. Eight.
114.		**R1:**	Let's see.

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115.		**Mrs. O**	Did you just remember four just now, or what were you thinking about?
116.		**Milin:**	No. I was thinking about because if this had this (*he takes two reds put together and shows how you only have four patterns with two reds "stuck" together by traveling up RYYYY*) then there would probably be two like this, two and then another two here and another two here and another two here.
117.	00:10:06	**R1:**	Can you show me that? Can you show me that kind or show Mrs. O'Brien?
118.		**Milin:**	It's like this. (*He picks up YRYYY*)
119.		**Mrs. O**	Oh.
120.		**R1:**	Oh, okay. You mean this is where you have two's moving. Okay.
121.		**Milin:**	(*He compares YRRYY & YYYRR*) See, but there's one missing right there.
122.		**R1:**	Can you build it?
123.	00:10:22	**Milin:**	Can I use these two? (*He shows R1 YRRYY & YYYRR*)
124.	00:10:24	**R1:**	Oh sure, use those two and then, but let's don't tear up these (*R1moves Group C away - Milin: builds YYRRY*). Oh I see what you're talking about.
125.		**Milin:**	See, this goes from here, here, here and then there's going to be another two. One here and one here. (*He points to imaginary RRYYY*)
126.		**R1:**	Can you make another two? (*He builds YRYYY*)
127.		**Milin:**	Whoops.
128.		**R1:**	It's gotta have…
129.		**Milin:**	Two reds (*He builds another YRYYY - Thinking aloud*) Two reds ...
130.		**R1:**	But you got that one.

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131.		**Milin:**	Ah. (*He builds RRYYY and adds it to the pile – Sighs*)
132.	00:11:16	**R1:**	Okay. And that's what you guessed, wasn't it? That there're four? (*She points to Group E*)
133.		**Milin:**	Uh huh.
134.		**R1:**	Okay, and so this has two reds and three yellows for a staircase.
135.		**Milin:**	Two reds and three yellows on all of them. (*He refers to Group E*)
136.		**R1:**	On all of them? Is there any other way to have a tower that has two reds and three yellows except in a staircase? (*R1 is guiding him to look for alternatives*)
137.	00:11:39	**Milin:**	No, (*he shakes his head*) because ... see ...there's not gonna be any because see if you put ... (*he refers to Group E - he points out the downward pattern of 2 reds in the staircase*) it'll only be one if you have three because see these two could go in there, these two, these two and these two. That's it.
138.	00:11:57	**R1:**	Uh huh. To make a staircase okay. And so there's these four ... (*she refers to Group E*)
139.	00:12:02	**Milin:**	Uh huh.
140.		**R1:**	you had five here ... (*She refers to Group C*)
141.		**Milin:**	And these four ... (*He refers to Group E*)
142.		**R1:**	Yeah, and these are staircases
143.		**Milin:**	Uh huh.
144.		**R1:**	Okay, but I don't see how you're going to get from here
145.		**Milin:**	See…
146.		**R1:**	to thirty-two.
147.		**Milin:**	See, this is double because of the yellows. (*He points to Group C*)

Line	Time	Name	Transcript
148.		**R1:**	Uh huh.
149.		**Milin:**	So this would be ten (*he points to Group C)* and this would be eight (*he points to Group E)* so that would be eighteen so far.
150.		**R1:**	Okay.
151.		**Milin:**	And then on the three's there would be probably three on each.
152.		**R1:**	Show me.
153.	00:12:34	**Milin:**	Because...
154.		**R1:**	Okay, perhaps you ... it would help me ... what's the double of this going to look like? (*She points to RRYYY)*
155.		**Milin:**	This is gonna look like three reds and two yellows. (*He points to RRYYY to describe its double).*
156.	00:12:46	**R1:**	Could you build it? It's not this one, is it? (*She points to RRRYY)*
157.	00:12:50	**Milin:**	This one is for this. (*He places RRRYY next to YYYRR)*
158.		**R1:**	Oh I see. Okay ...
159.		**Milin:**	See the doubles ...
160.		**R1:**	Okay can you build the doubles because I'm having a hard time imagining?
161.		**Milin:**	And this and this are doubles. (*He places YRRYY next to RRRYY, and points to YYRRY as it's double by mistake*) Um...
162.		**R1:**	That one is the double for this? (*She points to RYYRR & YRRYY)*
163.		**Mrs. O**	No, that one goes to this one. (*Mrs. O'Brien points to YYRRY)*
164.		**Milin:**	*No,* for this. (*He points to YYRRY)*

Line	Time	Name	Transcript
165.	00:13:12	**R1:**	Show me
166.		**Mrs. O**	I don't... understand.
167.		**R1:**	I don't understand why this is the double for this one? (*She points to RYYRR and YYRRY*)
168.		**Milin:**	No, no ... This is the double for this. Because, nah, oh I didn't see that. (*He figures out his mistake and puts RYYRR and RRRYY aside*) These don't go over there.
169.		**R1:**	Okay. Just make me the doubles, that'll help.
170.		**Milin:**	This is the double for this. (*He builds another RRRYY and puts it next to YYYRR*)
171.		**R1:**	Hum, yeah, that is the same as this one. (*She points out the original RRRYY*)
172.		**Mrs. O**	That's okay.
173.		**Milin:**	I'll just put it underneath. (*Meta-analysis – RRRYY underneath YYYRR*)
174.	00:13:44	**R1:**	Oh, maybe that would be easier.
175.	00:13:54	**Milin:**	(*Thinking aloud*) I need two yellows (*he builds another RYYRR*) and the one on the top and that'll match ... (*he sigh)s* oh yeah, this one ...
176.		**R1:**	Uh huh
177.		**Milin:**	This will match with this (*he puts it underneath YRRYY*)
178.		**R1:**	Uh huh.
179.		**Milin:**	and (*he sighs and builds RRYYR),* this will match with this ... (*he puts it underneath YYRRY*)
180.		**R1:**	Uh huh.
181.		**Milin:**	And (*he builds YYRRR),* this will match with this. (*He puts it underneath RRYYY*)
182.		**R1:**	Oh, oh, yeah. You told me there was going to be eight. That's right.

Line	Time	Name	Transcript
183.		Milin:	That matches. See all of these (*he points to Group F*) look exactly like all of these. (*He points to Group E*)
184.		R1:	Yeah they're the doubles. Yeah, I understand that. Okay, and so you have ten of these (*she points to Group C*) and you have eight of these. (*She points to Group E &F*)
185.		Milin:	And on the three's they'll probably be um ...
186.	00:14:53	R1:	*(Interrupting)* Show me what a three would look like.
187.		Milin:	On the yellows, I'll do it right now (*he builds another YYYRR)* ... like this.
188.		R1:	But don't you already have that?
189.		Milin:	*(He thinks)*Yeah ... see right here. (*He puts the new YYYRR on top of the old YYYRR*)
190.		Mrs. O	So are you gonna count that?
191.	00:15:14	Milin:	No. (*He pulls YYYRR apart*)
192.	00:15:15	R1:	So can you count it again? Okay, are there any other towers? We've got... you said this was all the towers that had one red and four yellows
193.		Milin:	Uh huh.
194.		R1:	Okay, is this all the towers that have two reds and three yellows? (*She refers to Group E*)
195.		Milin:	Uh huh. (*He rearranges the duplicate YYYRR he built earlier*)
196.		R1:	And so we just have eighteen?
197.	00:15:40	Milin:	But then what about the three's?
198.		Mrs. O	Show us some three's.
199.		R1:	Show us some three's.
200.		Mrs. O	You showed us one and this was ...

201.		Milin:	Oh yeah.
202.		Mrs. O	You said was the same as this one. Are there any other, maybe any other three's you could make?
203.		Milin:	Probably not. (*He chuckles*)
204.		Mrs. O	Do you want to try something?
205.		R1:	Try something out.
206.		Milin:	(*He builds another YYRRY*)There's this (*he realizes it's a duplicate and points it out*)... yeah, because see all these yellows have three so you can't make any others with three.
207.		R1:	Does it have to be a staircase?
208.	00:16:17	Milin:	Um, yeah. Because then you would have to have something like this (*he puts the duplicated YYRRY on top of the old YYYRY*)and then you have to have another one.
209.	00:16:29	R1:	Uh huh. Yesterday you had thirty-two
210.		Milin:	Yeah…Maybe we had doubles of something? (*he pulls duplicate YYYRY apart. He is getting fidgety, nervous and seems unsure of himself*)
211.		R1:	Oh I don't know!
212.		Milin:	We got two's. we've got four of these (*points to towers with 2 reds and three yellows*)
213.		R1:	Uh huh
214.		Milin:	Ones all of them like…(*has a tower of all reds in his hand*)
215.		R1:	You did your ones (*points to the group of towers with four yellows and one red*)
216.		Milin:	This…uh you have to go to fours (*he smiles and puts #1 aside.*) That's where I messed up. Yeah. See if you have um four yellows it will look like this so… (*he puts four yellows together and waves it over group E. he adds one more yellow to make YYYYY*)

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217.		R1:	It's right here. But you already have one *(she points to the set of towers with four yellows and one red)*
218.		Milin:	Guess there probably would be 22
219.		R1:	Oh no! Uh what I am really wondering is… were there any other patterns you had yesterday? Except for staircases.
220.		Milin:	Umm…
221.		R1:	In terms of your towers can you remember any other patterns that you might have had? The way you put your blocks together to make towers that were…
222.		Milin:	This *(holds up a tower of all yellows)*
223.		R1:	There's some. How many of them were there?
224.		Milin:	Two.
225.	00:17:48	R1:	Yeah… okay.
226.		Mrs. O	Put those here if you want. *(He puts them next to Group C)*
227.		R1:	Uh huh.
228.		Milin:	Four's. There should ... probably be like ... three.
229.		Mrs. O	What do you mean?
230.		Milin:	On four's, there should be three maybe... *(He guessing)* ... I don't know, but that would go with this. *(He points to Group C)*
231.		R1:	Uh huh.
232.		Milin:	So maybe we made doubles on the staircase?
233.		R1:	I wonder ... I wonder if you could take this tower right here? *(She give him YRRYY and then pulls it back)* Actually, I'm going to give you this one *(she stands up RYYRR)* because we have a double of it. Is there a way you could rearrange those blocks in some way so that it

Line	Time	Name	Transcript
			looks different from all these other towers?
234.		**Milin:**	*(He builds YRRRY)* This? Yeah, this
235.		**R1:**	*(Pause)* Yeah, so that's one other one.
236.		**Milin:**	So I guess there might be thirty-two still.
237.		**R1:**	Okay. I don't know. I'm just trying to say now. Hey now, let's keep that one there and then let's see is there another way you could rearrange *(he attempts to pick up YYYYY)* ... let's don't mess up ... is there another way you could rearrange these *(she hands him YRRRY)* so that it would look different still?
238.		**Milin:**	*(He builds RYRYR)* This
239.		**R1:**	Gosh! Look!
240.		**Mrs. O**	You don't have that anywhere yet... do you?
241.		**R1:**	I wonder?
242.		**Milin:**	Because all of these are together. *(He points to Groups C, E and F)*
243.		**Mrs. O**	Um ... oh, they're sep ....
244.		**R1:**	Oh.
245.		**Mrs. O**	Oh ... oh, is that what you mean?
246.		**Milin:**	Yeah.
247.		**R1:**	These were your staircase groups.
248.		**Milin:**	So on this *(he points to RYRYR)* I could still make another one ... like ...
249.		**R1:**	This, this has how many? How many yellows and how many reds? *(She points to RYRYR)*
250.		**Milin:**	Um two yellows and three reds
251.		**R1:**	Uh ... so it really goes with this group down here ... doesn't it? *(She points to Group E)*

252.		**Milin:**	Yeah.
253.		**R1:**	Of two yellows and three reds.
254.		**Milin:**	This is another one that goes with this. (*He builds YRYRY and puts it next to RYRYR*)
255.		**R1:**	You mean that's its partner?
256.		**Milin:**	Yeah.
257.		**R1:**	Okay, does it have two yellows and three reds?
258.		**Milin:**	No, but it has ... see the yellows turn to reds and the reds turn to yellows. (*He points to YRYRY and RYRYR*)
259.		**R1:**	Oh, oh, okay. So if ... alright. And what about this one? (*She points to YRRRY*)
260.		**Milin:**	(*He builds RYYYR*) Has this as a partner.
261.		**R1:**	Uh huh.
262.		**Milin:**	So there's so far on this, there will be eighteen and twenty, twenty-two and twenty-four (*He sighs as he counts towers of staircases*)
263.		**R1:**	Uh huh.
264.		**Milin:**	And now we have to get er ... eight... um (*He sighs and tries out new towers of five*)
265.		**R1:**	I'm thinking ... if this has got two yellows and three reds and this ones got two yellows and three reds ... (*She starts Groups G and H*)
266.		**Milin:**	This could work. (*He builds YRRYR*)
267.		**R1:**	Let me see ... has it got two yellows and three reds also?
268.		**Milin:**	No ... yeah. So now I'll get two reds and three yellows. (*Meta-analysis*)
269.		**R1:**	Oh, to go over here? (*She refers to Group G*)

Line	Time	Name	Transcript
270.		**Milin:**	*(He sighs and builds RYYRY)*This is because one of them is separated, so you can't make it like this. *(He points to Group F)*
271.		**R1:**	Oh, explain what you mean, what you mean by that?
272.	00:22:06	**Milin:**	So ... if one separated ... *(he points to RYYRY)* See on this the red separated ... um ... but ... I mean the yellow's separated by the red ... so this and these two
273.		**R1:**	Oh, I see.
274.		**Milin:**	And this, they're just putting it like three. *(He points to Group F)*
275.		**R1:**	Oh, I see. So that's the difference.
276.	00:22:27	**Milin:**	Together ... uh huh.
277.		**R1:**	Yeah, and so for these are the ones that are separated. *(She points to the yellows on RYYRY)*
278.		**Milin:**	Uh huh.
279.		**R1:**	But now this one *(she points to RYYRY)* is a partner to one of these, isn't it? *(She points to YRRYR and RYRYR)*
280.	00:22:38	**Milin:**	It's a partner to ...
281.	00:22:40	**R1:**	This is the opposite.
282.		**Milin:**	This. *(He holds up YRRYR)*
283.		**R1:**	To that one, yeah. Okay, so if these ... these
284.		**Milin:**	And these two are partners to these two. *(He groups together partners RYYYR and YRRRY, YRYRY and RYRYR basically reorganizing R1's Groups G and H into his own type group of partners)*
285.		**R1:**	Yeah, yeah, yeah, okay. Which ones are the ones with two yellows and three red because that's what we were working on?
286.		**Milin:**	Um, the two yellows and three reds are this one, this ...

Line	Time	Name	Transcript
287.		R1:	This one, okay. (*She picks up YRYRY*)
288.		Milin:	No, two yellows and three reds is this one. (*He picks up RYRYR)*
289.		R1:	Yeah, okay. So we'll put it here, and this partner right over here ... (*She rearranges his patterns into Groups G and H)*
290.		Milin:	This goes like this ... (*He moves RYYRY and YRRYR into the group)*
291.		R1:	Uh huh.
292.		Milin:	And this goes like this. *(He moves RYYYR and YRRRY into the group)*
293.		R1:	Okay, are there any others that can fall into that category?
294.		Milin:	Well, yeah.
295.		R1:	What do you know? (*She pauses while Milin plays around with the towers)* You were saying ... what were you saying about them being separated?
296.		Milin:	They have to be separated otherwise they'll be exactly like this, this and this. (*He points to Groups C, E and F)*
297.		R1:	Oh.
298.		Milin:	*(He builds YRYYR) Do* we have this?
299.		R1:	I don't know ... that's three yellows and two reds ... that means it goes up here. (*She points to Group G*) Do you have it?
300.		Milin:	No, I don't get, think so because this is separated by this and this. These two are separated by that. (*He points to the cubes on YRYYR)*
301.		R1:	How's it different from this one? (*She points to RYYRY)*
302.		Milin:	Because see ... (*He puts RYYRY next to YRYYR)*
303.		R1:	Oh

Line	Time	Name	Transcript
304.		**Milin:**	these two are down here ... *(He points to the yellow cubes on YRYYR)*
305.		**R1:**	I see ... that's kind of a double staircase. Does it have a partner?
306.		**Milin:**	Yeah ... *(he builds RYRRY)* this ... see
307.		**R1:**	Uh huh. Yeah. Which group does it go with? Two yellows and three reds? Or yeah ...
308.		**Milin:**	See ... this. *(He puts RYRRY with Group H)*
309.		**R1:**	Okay.
310.		**Milin:**	That would be eighteen, twenty ... *(Counting to himself)*
311.	00:24:47	**R1:**	Okay. Can.. is there any others that you could see, that would follow those kinds of
312.		**Milin:**	Um, there's probably another pair.
313.		**R1:**	Uh huh.
314.		**Milin:**	I'll try this, this, and this ... *(he builds a duplicate RYYRR)* Do we have this yet?
315.		**R1:**	Beats me. Which is that? Two reds and three yellows or two ... which ... which ...
316.		**Milin:**	Three reds and two yellows ...
317.		**R1:**	So which group does it go in?
318.		**Milin:**	This ... *(He refers to Group H)*
319.		**R1:**	This down here. Oh I see. What did you do that time?
320.	00:25:24	**Milin:**	This time I separated by two yellows, then over here.
321.		**Mrs. O**	Did we have two yellows anywhere else?
322.		**Milin:**	No. Not together. Up here. *(He points to the top of duplicate RYYRR)*

Line	Time	Name	Transcript
323.		R1:	Uh huh.
324.		Milin:	And see if you had a red here (*he points to the bottom yellow cube of RYYRY)* then it would be the same as this. (*He points to RYYRR*)
325.		R1:	Uh huh. Looks good to me.
326.	00:25:44	Mrs. O	We don't... so you're just now checking in here cause you know that you've already used all those?
327.		R1:	You don't need to check over here? (*She points to Group F)*
328.		Milin:	Because these (*he points to Groups C, E and F)* are all together, so right now I'm splitting these apart so they…
329.		Mrs. O	What are you splitting apart here? (*She points to duplicate RYYRR*)
330.		Milin:	Here I'm splitting apart these so ... all of these reds ... so they won't go ...
331.		R1:	Oh. And you don't think there's anything over here (*she points to Group F)* that's the same way?
332.		Milin:	There can't be because on these (*he points to Group F)* they're all together.
333.		Mrs. O	What's together over here? (*She points to Group F)*
334.		Milin:	On this, see they're all three together and these two are together. (*He points to Group F)*
335.		Mrs. O	But not here (*she points to RYYRR)* and not here. (*She points to RRYYR)*
336.	00:26:22	Milin:	Oh yeah, you're right. (*He realizes he has a duplicate RYYRR)* This goes with this ... um ...(*he compares duplicate RYYRR to original RYYRR -sighs - builds YRRYR and compares it to Group H)* we have this ... (*he builds RRYRR)* this ... yeah I think ...(*He is trying to create a new tower*)
337.		R1:	Yeah, that's what ...

Line	Time	Name	Transcript
338.		**Milin:**	That's (*he points to rryrr* the double to this. (*He points to yyryy*)
339.		**R1:**	Yeah, yeah ... we said ... you said you really thought there were only ten of these. (*She points to Group C*)
340.		**Milin:**	Uh huh. There has to be because there's doubles.
341.		**R1:**	Yeah, yeah. So we have to be playing with two of one color and three of another and you have these. (*She points to Groups A and B*)
342.		**Milin:**	(*He builds YRYRR and compares it to all the other towers*) This ...
343.		**R1:**	What, you have two yellows there?
344.		**Milin:**	Here ...
345.		**R1:**	Yeah.
346.		**Milin:**	(*He refers to YRYRR*) This works so probably ... (*He sighs -he's getting nervous - he builds RYRYY - he sighs again*) This would work, see ... because it's the double of this. (*He points to YRYRR*)
347.		**R1:**	Uh huh. And which group does it go with?
348.	00:28:26	**Milin:**	Goes with this. (*He puts YRYRR with Group G*)
349.		**R1:**	Uhhuh. Yeah.
350.		**Milin:**	(*He counts all the towers that are completed*) That'll be ten, twenty, thirty, I think
351.		**R1:**	Uhhuh.
352.		**Milin:**	Yeah thirty, so I need another pair.
353.		**R1:**	You need one more pair. Hey, we're getting close, aren't we? How are you keeping track? How did you know you had thirty?
354.		**Milin:**	Um, because this (*he points to Group C*) is um twenty and these two ... (*He points to Groups G and H*)

Line	Time	Name	Transcript
355.		R1:	What do you mean "this is twenty"?
356.		Milin:	Twenty, I mean ten.
357.		R1:	Oh, okay.
358.		Milin:	Because of this and ... this and this are twenty altogether with this and then these two have another ten. That'll be thirty. (*He points to Groups C, E, F, G and H)*
359.	00:29:11	R1:	We're getting close. Mrs. O'Brien, I'm getting excited. (*They both laugh*) And you think it has to have two yellows and three reds? (*Milin: is concentrating on building the last pair)*
360.		Milin:	Could have four ... um ... yellows and one red, I mean no it can't be. (*He laughs*)
361.		R1:	Really, no.
362.		Mrs. O	(*She laughs)* He saw that. I think I saw his eye go up.
363.		R1:	Yeah and he said "uh-oh", so it has to, doesn't it. Gosh (*she whispers)* I bet we can find it.
364.		Milin:	Um ... (*He builds RRYRY)* This has to be with one of these (*he points to Group H)* or it's not in, because see, on these (*he points to Groups C, E and F)* you didn't split them.
365.		R1:	Okay, say that one again. How are you checking? Is that ... are you explaining how you got to check it?
366.		Milin:	Yeah, see if I don't see them in these ... (*He compares to Groups G and H)* I don't ... there can't be any of these in here. (*He points to Group E)*
367.		R1:	Uh huh.
368.		Milin:	Because there's three of these ...(*He points to the yellows on Group E*)
369.		R1:	Uh huh
370.		Milin:	and only ... see ... it's split

Line	Time	Name	Transcript
371.		Mrs. O	It's split
372.		Milin:	and see ...
373.		R1:	You mean ... what's split?
374.		Milin:	So it's split.
375.	00:30:43	R1:	The yellows.
376.		Milin:	So we don't have this and these two.
377.		R1:	Yeah ... over here they're not split.
378.		Milin:	Yeah.
379.		R1:	Okay.
380.		Milin:	This would probably work. (*He points to RRYRY*)
381.		R1:	Probably.
382.		Milin:	Cause there's not two reds on top of anywhere.
383.	00:30:57	R1:	Oh I see. Here's the ... show me the two reds on the bottom.
384.		Milin:	This. (*He points to the two reds on YRYRR*)
385.		R1:	Okay.
386.		Milin:	And there'll be ... (*he builds YYRYR)* ... this. (*He puts YYRYR with Group G*)
387.		R1:	So now we've ... have we found 32?
388.		Milin:	Uh huh.
389.		R1:	Do you think you're done?
390.		Milin:	Yeah.
391.		R1:	Why?
392.		Milin:	Because ... see if you could still make a staircase out of this probably ... see ... this ... this could go here. (*He*

Line	Time	Name	Transcript
			arranges Group G into a staircase pattern)
393.		**R1:**	Is that one of these?
394.		**Milin:**	This could go here ... goes to this, this ... whew really. I don't know, but, see we can't ... if you're going on yellows ... then two ... this. (*Meta-analysis*)
395.		**R1:**	Uh huh. ah
396.	00:32:13	**Milin:**	Here.
397.		**R1:**	Uh huh, that's one.
398.		**Milin:**	This one cause see it goes all the way up here and then it's going down.
399.		**R1:**	That's a pretty pattern ... yeah.
400.		**Mrs. O**	Where's the pattern? I'm not sure I see it Milin:.
401.		**Milin:**	See ... goes from here to here ... here ... (*He points to the yellow in the staircase pattern of Group G*)
402.		**Mrs. O**	Oh, I see
403.		**Milin:**	Here ... here and then it's going ... then it's going down.
404.		**Mrs. O**	Oh.
405.		**Milin:**	(*Thinking aloud*) Um ... two ... two ... two ... (*he takes towers from Group H and continues them in a staircase pattern with Group G*) you could put that here ... let's get four ... and two. (*He sighs*) But I can't find a three but I could go from here to ... from this
406.		**R1:**	Yeah.
407.		**Mrs. O**	Oh
408.		**Milin:**	And this …
409.		**R1:**	That's really nice. Yeah, there's lots of ways to fit those together. But you really think you have them all?
410.	00:33:18	**Milin:**	Uh huh.

Line	Time	Name	Transcript
411.		R1:	You know you have all of these. (*She points to Groups E and F)*
412.		Milin:	Uh huh.
413.		R1:	You know you have all of these. (*She points to Group C)*
414.		Milin:	But when we came to the separating spot we kept on checking them
415.		R1:	Uh huh.
416.		Milin:	And we took about 10 minutes and still didn't find any.
417.	00:33:39	R1:	Yeah, yeah, yeah, yeah.
418.		Milin:	Then we got a couple of duplicates.
419.		R1:	Yeah, yeah..
420.		Milin:	And we checked them.
421.		R1:	And so, how many of these (*she points to Groups G and H)* with two and three did we find?
422.	00:33:52	Milin:	Um, I think twelve.
423.		R1:	How many do you have in front of you? Twelve? Yeah I think twelve too.
424.		Milin:	Twelve.
425.		R1:	Yeah. Okay, those had ...
426.	00:34:03	Milin:	Um.
427.		R1:	Those had two and three. (*She points to Groups G and H)*
428.		Milin:	Yeah
429.		R1:	Did these have two and three also? (*She points to groups E and F)*
430.	00:34:08	Milin:	Yeah.

Line	Time	Name	Transcript
431.		R1:	So how many with two and three altogether?
432.		Milin:	Um (*he counts to himself*) two ... twenty.
433.		R1:	Yeah, and then how many with four and one?
434.		Milin:	Um, ten.
435.		R1:	And how many ... What are these things? (*She points to RRRRR and YYYYY*)
436.		Milin:	These are all (*he picks up RRRRR and YYYYY*) ... all of these are red and all of these are yellow.
437.		R1:	And we think we've got them.
438.		Milin:	Uh huh.
439.		R1:	Okay, can you ... let's just to keep our notes complete. Ah (*she reads what he has written so far*) ... we said two yellows and four reds are five. Two reds and four yellows are five. I mean one red and four yellows. Then you said two reds and four yellows.
440.		Milin:	See I didn't get up to these. (*He refers to all the groups which have 2 and 3 of each color*)
441.		R1:	Well, oh sure. Well we can wait. We can come back and do that. I'd like to ask you another question.
442.		Milin:	What?
443.		R1:	Um, you said you'd done activities like this before.
444.		Milin:	Uh huh.
445.		R1:	Last year …
446.	00:35:08	Milin:	Yeah.
447.		R1:	Or sometime …
448.		Milin:	Yeah.
449.		R1:	Yeah. If I was going to say, "Gosh, we really worked so

Line	Time	Name	Transcript
			hard to figure out towers of five", and Mrs. O'Brien and I sort of left and said, "Golly". Could you have made towers of four instead of five?
450.		**Milin:**	Yes.
451.		**R1:**	If you made towers of four, how many do you think there would have been?
452.		**Milin:**	Um (*thinks*) ... Can I do this on a math problem?
453.	00:35:41	**R1:**	You can do it any way you want to.
454.		**Milin:**	*He writes a column of "8 + 6 + 4 + 2"* (*and then adds them together and writes "20"*)About twenty.
455.	00:36:03	**R1:**	How did you figure that out?
456.		**Milin:**	Um, because it's like this. On this (*he points to Group C*) ... twenty, about twenty because of these. (*He points to Groups C, E and F*)
457.		**R1:**	Okay, what do you mean by these? What is this? (*She refers to Group C*)
458.		**Milin:**	This would be about ten (*he refers to Group C, specifically RYYYY*) but if you take one away because of the four's ... (*He uses a planning ahead strategy to describe the reduction of towers of five to towers of four*)
459.		**R1:**	Uh huh.
460.		**Milin:**	then that will be four and that will be eight ...
461.		**R1:**	Okay.
462.		**Milin:**	and on the three's take this (*he refers to Group E, specifically YYYYRR and RRRYY*)and this away and that'll be six.
463.		**R1:**	Uh huh.
464.		**Milin:**	But then when it comes to the two's then that. (*He refers to Group I*) But then I don't know how many of these so, it's gonna be around twenty somewhat. (*He approximates*)

Line	Time	Name	Transcript
465.		R1:	Okay. So you know, you know there's eight of these and you know there's six of these and you know there's two of these. (*She refers to all the groups*)
466.		Milin:	But to be exact then there's twelve of these (*he points to Group I*)and then they'll probably be ... makes this ... twenty-eight. (*He crosses off the total "20" on his paper and writes "28"*)
467.		R1:	I'm confused.
468.		Milin:	See, cause on this, right... (*He refers to Group I*)
469.		R1:	Yeah.
470.		Milin:	It'll take about four off of this because ...
471.		R1:	So you take maybe. How many of these were there, twelve? (*She refers to Group I*)
472.		Milin:	Uh huh. So take four off of that and that'll be eight.
473.		R1:	Okay, and so then there were six of these (*she points to Group E, means six of four cubes high),* and eight of these (*she points to Group C, means eight of four cubes high),* and two of these (*she points to YYYYY and RRRRR),* and eight of these. (*She separates a random eight of twelve towers from Group I*)
474.		Milin:	Uh huh.
475.		R1:	How many of that was that all together?
476.		Milin:	I think twenty eight and um ... eight and um ...
477.		R1:	Eight of these and six of these and two of these ...
478.		Milin:	and ...
479.		R1:	(*R1restates the new amounts there would be in towers of four high. He rechecks the numbers in the column on his paper*) ... and eight of these.
480.		Milin:	Okay, eight plus six plus two plus eight

Line	Time	Name	Transcript
481.		**R1:**	Yeah. How did you decide about the eight of these? (*She points to Group I*)
482.		**Milin:**	Um... I was thinking that there would be eight because ... see, these four (*he refers to the four from Group I that R1 put aside*) would probably get out because um there's only four, so take these things off so ...
483.		**R1:**	Okay, can I divide ... can, you know what would help me a lot Milin: (*he doesn't listen, he rechecks his #'s on the paper and writes "24"),* is if we split these. (*She points to RYRRY in Group I*)
484.		**Milin:**	I got twenty-four.
485.		**R1:**	Can we split these back into ... (*she points to Group I*) these are two yellows and three reds (*she puts YRRRY next to RYRRY*), two yellow and three reds. (*Milin is not listening*)
486.		**Milin:**	It has to be less than five's because um five is a higher number and ...
487.		**R1:**	Yeah.
488.		**Milin:**	It'll probably be more ...
489.		**R1:**	It would be less than ... If there were thirty-two for the other, it would be less.
490.		**Milin:**	That's about it.
491.		**R1:**	Yeah. What about if you only had towers of three?
492.		**Milin:**	Then take another one off of these ... (*He points to , YYRRY and RRYYR*)
493.		**R1:**	Yeah.
494.		**Milin:**	That'll be …
495.		**R1:**	Show me what a tower of three would look like.
496.		**Milin:**	This. (*He has a tower of two red and one yellow in his hand from a tower of five he pulled apart*).

Line	Time	Name	Transcript
497.		R1:	Yeah, hah hah, yeah. How many do you think there'd be for towers of three?
498.		Milin:	It's probably going to be less than towers of four.
499.		R1:	If you had to guess, what do you think?
500.	00:39:34	Milin:	Um...
501.		R1:	Can you imagine?
502.		Milin:	Eighteen.
503.		R1:	You think there'd be eighteen of those?
504.		Milin:	Uh huh.
505.		R1:	Yeah, yeah, yeah. What about towers of two?
506.	00:39:50	Milin:	Um ...
507.		R1:	Can you tell me what in your mind? Can you imagine what they would look like and how many there would be? Can you build them?
508.		Milin:	It would be like this. (*He shows her 2 red cubes together(RR) which he has in his hand.*)
509.		R1:	Yup. Okay. What would they look like then? Tell me.
510.		Milin:	Um...
511.		R1:	And how many would there be?
512.		Milin:	I could do this right now.
513.		R1:	Well sure.
514.		Milin:	(*Thinking aloud*) One of these, switch that around. (*He builds RY)*
515.		R1:	Uh huh.
516.		Milin:	(*He builds YR)* Like this.
517.		R1:	Uh huh.

Line	Time	Name	Transcript
518.		**Milin:**	*(He builds YY)* About four. *(He laughs)*
519.		**R1:**	You think?
520.		**Milin:**	On one's there would only be two.
521.		**R1:**	That's right. Could you write that down so we can remember? So towers of one ... Here's one. *(She puts one red cube aside)* What's the other one?
522.		**Milin:**	One yellow. *(He chuckles)*
523.		**R1:**	*(She chuckles)* Okay, and towers of two? *(Milin writes "1 towers of 2 are 4")*
524.		**Milin:**	Um, four
525.	00:40:54	**R1:**	What about towers of three?
526.		**Milin:**	Towers of three? *(He writes "Towers" and puts down the pen.)* Okay
527.		**R1:**	Can you think about it and imagine them now that you've built the towers of two, or would you have to start all over? What do you think?
528.		**Milin:**	You could put another one of these on this. *(He adds a red to RR to make RRR)* There's gonna be about seventeen or some, I mean sixteen *(approximates)* or something like that. *(He adds a yellow to YY to make YYY)*
529.		**R1:**	I don't know. Okay.
530.		**Milin:**	Towers of one would be ... *(next to "Towers" he writes "of 1 are 2")*
531.		**R1:**	You said there would be two ... uh, huh.
532.		**Milin:**	Cause then only one tower ...
533.		**R1:**	*(Interrupting)*And towers of two would be four and towers of three ... *(she stands up RRR and YYY)* I see two of them.

Line	Time	Name	Transcript
534.	00:41:46	**Milin:**	Probably be six.
535.		**R1:**	I wonder. Why, because of ... Why did you say six?
536.		**Milin:**	Because um ... it could be because if we had towers of two. (*He stands up RY and YR*) One would be two, four I mean. Two would be four.
537.		**R1:**	Uh huh.
538.		**Milin:**	Three could be six.
539.		**R1:**	Could be? But awhile ago you said it might be eighteen. Ah, I'm curious; do you think it will take a long time to do towers of three?
540.		**Milin:**	Ah yeah.
541.		**R1:**	Let's think a minute. You got these. (*She refers to RRR and YYY*) What would be the next ones you'd put in there?
542.		**Milin:**	(*He builds RYY*) This.
543.		**R1:**	Uh huh.
544.		**Milin:**	(*He builds YRR*) This. See that would be another pair of three
545.		**R1:**	Uh huh, okay.
546.	00:42:43	**Milin:**	There's two yellows and one red on the bottom. (*He builds YYR)*
547.		**R1:**	Okay.
548.		**Milin:**	(*Thinking aloud*) And two ... two reds and one on the bottom (*he builds RRY) ..s*o that's already six, but I know that you can make more than that.
549.	00:43:01	**R1:**	What do you think? What else could you make? You have um with the one on the top ... you have um ...
550.		**Milin:**	(*He builds RYR*) See, another. See if you have ... um ...
551.		**R1:**	Okay, is there anymore?

Line	Time	Name	Transcript
552.		**Milin:**	Uh huh. But see if you have three right,
553.		**R1:**	*Yup.*
554.		**Milin:**	I would think about eighteen (*R1 puts her arms out and has a puzzled look on her face*) because there could be about six pairs.
555.		**R1:**	Well let's see. Okay, does that one have
556.	00:43:33	**Milin:**	Uh huh.
557.		**R1:**	A pair? (*She refers to RYR*)
558.		**Milin:**	See, (*he builds YRY*) like this.
559.		**R1:**	Okay, now here is this. Is ... what else could you do?
560.		**Milin:**	*(There's so far eight).* He plays around with the cubes, looking for missing towers
561.		**R1:**	Here were the ones that were just one color ... (*she refers to rrr and yyy*) isn't that right?
562.		**Milin:**	I think about... (*he realizes he can't make any more*) only eight
563.	00:44:16	**R1:**	Boy, that's a big change. You told me eighteen just a minute ago. You think about only eight. Why?
564.		**Milin:**	Because now I will get another duplicate of this on that. (*He points to the whole group of eight*) See if you had about four it would be about twelve. (*He's referring to towers of four*)
565.		**R1:**	You're really changing your mind. Okay, but you're saying there's only eight ... (*She brings him back to towers of three*)
566.	00:44:41	**Milin:**	Yeah, because see if you did this ... (*He refers to RYR and YRY*)
567.	00:44:43	**R1:**	Uh huh.
568.		**Milin:**	and these four could probably go together (*he groups RYY with RRY, and YYR with YRR*) because urn this ... see. (*He*

Line	Time	Name	Transcript
			points out a pattern - Meta-analysis)
569.		**R1:**	The same as over here? (*She points to the towers of five)* Is that what you're thinking?
570.		**Milin:**	Yeah.
571.		**R1:**	Yeah.
572.		**Milin:**	This would be a pair of four. (*He refers to this last group of four)*This is only a pair of two. (*He refers to RYR and YRY*
573.	00:45:02	**R1:**	Uh huh.
574.		**Milin:**	With this. (*He puts RYR and YRY with RRR and YYY)*
575.		**R1:**	And there's no more?
576.		**Milin:**	Yeah. (*He sighs)*
577.		**R1:**	My goodness! So you really changed your mind. Okay, so towers of three have how many
578.	00:45:18	**Milin:**	Um... eight.
579.		**R1:**	Can you write that down? (*He puts one hand on his head while he writes "Towers of 3 are 8")* What was the first kind of towers we did, five?
580.		**Milin:**	No, yellows and reds are five.
581.		**R1:**	Yeah, no, yeah. But these?
582.		**Milin:**	One yellow and four red.
583.		**R1:**	No, no, no. But the ... the problem you did yesterday were towers of five. (*Milin nods in agreement)* And how many did you say there were for that?
584.	00:45:48	**Milin:**	Thirty-two. Should I write it down? (*He anticipates her request)*
585.		**R1:**	If you don't mind.
586.		**Milin:**	(*He writes "Towers of 5 are 32"*)Okay.

Line	Time	Name	Transcript
587.		R1:	Okay, and so how many do we have (*she refers to what he wrote down*) … towers of one?
588.		Milin:	One, two, three and five.
589.		R1:	Okay, the only one we missed writing down is towers of four.
590.		Milin:	That's gonna be more than three, I know that.
591.		R1:	It's going to be more than three …
592.	00:46:23	Milin:	Because see …
593.		R1:	Do you want to change your …
594.		Milin:	Towers of four could be like this (*he adds a red to RYR to make RRYR*)or there could be another staircase … (*he takes two yellows off of YYYYY by mistake*)
595.		R1:	Um, Your guess awhile ago was twenty-four. (*He puts YYYYY back together*) Do you want to change your guess?
596.	00:46:44	Milin:	Um …
597.		R1:	Or do you want to stay with that? What do you think?
598.		Milin:	About … (*he pulls YYYYY apart again*) sixteen.
599.		R1:	Why in the world would you say sixteen?
600.		Milin:	Hah, hah. It's just a guess.
601.		R1:	What made you guess sixteen?
602.		Milin:	Nothing. (*He adds a yellow to YRY to make YYRY*)I just guessed that.
603.		R1:	Yeah?
604.		Milin:	Guessed numbers …
605.		R1:	You guessed twenty-four first and then you guessed 16 second.

Line	Time	Name	Transcript
606.		**Milin:**	*(Thinking aloud)* Two …(*he builds YYRR and RRYY*) another. (*He sighs*) Then there's also this, (*he .builds RYRY*) the most popular.
607.		**R1:**	Uh huh
608.		**Milin:**	Exactly like this (*he compares RYRY to RYRYR*) but only some
609.		**R1:**	Oh …but shorter yeah.
610.	00:47:49	**Milin:**	Starts like this.
611.		**R1:**	Yeah. What kind of start … (*Milin builds YRYR*) What are you thinking when you're going at these? You just build it?
612.		**Milin:**	No, I try something out and then I make the um duplicate but um a different way. (*Meta-analysis*)
613.		**R1:**	Yeah. Okay, all of these are towers of four that have …
614.		**Milin:**	So far, I got um six. (*He puts all six towers of four together*)
615.		**R1:**	Yeah and you think … if you had to guess, how many do you think there're gonna be?
616.		**Milin:**	*(Quickly replies)* sixteen
617.		**R1:**	You think there are gonna be sixteen. Yeah, yeah. You know why?
618.		**Milin:**	What?
619.		**R1:**	Um … um
620.		**Milin:**	*(He's getting restless and looking around)* Because um I took a lousy guess, because um four times four …
621.		**R1:**	Is sixteen. That's one way to think about it.
622.	00:48:51	**Milin:**	Um, like I guessed um three times three, it would be eight. That would be very near.
623.		**R1:**	Three times three?

Line	Time	Name	Transcript
624.		**Milin:**	Yeah, that would be nine and um eight is near so …
625.		**R1:**	Yeah, oh, yeah.
626.		**Milin:**	So now I think there will be about …
627.		**R1:**	But five times five?
628.		**Milin:**	Huh?
629.		**R1:**	So that was a guess. So anyway, but your real guess is sixteen. Is that right? Yeah.
630.		**Milin:**	Because see,(*he refers to his written sheet tower)* of three are eight, so and towers of five … I only had twenty-five so see …
631.	00:49:33	**R1:**	What were towers of one?
632.		**Milin:**	Towers of one?
633.		**R1:**	Uh huh.
634.		**Milin:**	Two
635.		**R1:**	Uh huh
636.		**Milin:**	Because you can't make any more.
637.		**R1:**	*(Laughs)* Yeah, that's pretty smart. And you said towers of two?
638.		**Milin:**	Um four.
639.		**R1:**	Uh huh.
640.		**Milin:**	Towers of three … eight, hah, hah. And towers of four … I don't know cause I didn't get through that yet.
641.	00:49:57	**R1:**	Yeah. But you guessed that was probably sixteen.
642.		**Milin:**	Yeah. Around sixteen.
643.		**R1:**	Yeah. Something around sixteen

Line	Time	Name	Transcript
644.		**Milin:**	Eighteen I guess or …
645.		**R1:**	Yeah. As I remember, when you were thinking about it before (*she pulls his paper closer to him*) you came up with another way of thinking about it. You said that there were gonna be-
646.		**Milin:**	Take one out of this … (*he refers to group C – he stands up with a burst of energy*)
647.		**R1:**	This Group here? (*She refers to Group C also*) What do you mean?
648.		**Milin:**	And that …
649.		**R1:**	Take one out? You take…
650.		**Milin:**	No, from the fives so that'll be four and then there'll be … this will be eight all together. This would be six.
651.		**R1:**	(*Interrupting*) yeah. How … if you were going to make that into a tower of ... she stands up group B that's still a tower of five. How could you make it into a tower of four?
652.	00:50:34	**Milin:**	Take these off. (*He refers to the tops of Group C*)
653.		**R1:**	Do it. (*He takes the tops off of Group B*) oh, I see.
654.		**Milin:**	See.
655.		**R1:**	So is that what you were thinking about?
656.		**Milin:**	Yeah, see … (*he sits down*)
657.		**R1:**	Uh huh
658.		**Milin:**	Um and they'll do the same thing …
659.		**R1:**	With the other color.
660.		**Milin:**	But it's gonna use up only less.
661.		**R1:**	Yeah.
662.		**Milin:**	So on this (*he points to RRYYR and YYYRR*) if you take

Line	Time	Name	Transcript
			the top off it'll do the same thing and … everything, it'll do the same thing.
663.		**R1:**	I see… yeah, I see. So that was when you took the top off
664.	00:51:10	**Milin:**	Yeah.
665.		**R1:**	Or actually you could take the bottom off, couldn't you? Where was the other one that went with this? (*She refers to Group E*)Here it is. Okay, and you said that was gonna shrink into being …
666.		**Milin:**	(*He stands up*) Yeah. See take …)this one (*he points to RRYYY* you take the bottom off I guess … hah … and all nah..
667.		**R1:**	But anyway, you were saying there would just be three (*she refers to Group E)* that had the staircase going up.
668.		**Milin:**	Yes, so take this one … (*he picks up YYYRR*)
669.		**R1:**	Away yeah.
670.		**Milin:**	No, one of them is away.
671.		**R1:**	Yeah.
672.		**Milin:**	Take this one away … (*he puts RRYYY aside*)
673.		**R1:**	Uh huh, yeah.
674.		**Milin:**	And take these off … (*he takes the yellow tops off of YRRYY, YYRRY and YYYRR*)
675.		**R1:**	Uh huh, yeah.
676.		**Milin:**	And then do the duplicates of that but put the other away. So that would be six plus eight. Right here, six plus eight. This I guess would be about um eight, (*he refers to what is left of Group I*) that's my guess because you take all of these off. And this our two. (*He picks up two solid towers and takes the tops off*)
677.		**R1:**	(*R1 nods and says "uh huh" throughout his explanation*) That's easy. Yeah.

Line	Time	Name	Transcript
678.		**Milin:**	And I got twenty-four. (*He refers to his column of numbers on his paper*) eight plus two…
679.	00:52:20	**R1:**	Yeah. I think we're gonna …I want you to really keep on thinking about that and maybe if we come back again you could have proved whether … cause you've got two guesses. You had a guess it was sixteen (*she points to his paper*) and a guess it was twenty-four and so how would you prove it?
680.	00:52:42	**Milin:**	By keep on building them.
681.		**R1:**	By keeping on building them. Okay let me ask you one more thing cause it's almost time for you to go, you got to eat lunch. Uh, do you remember any other activities that you've done, other than the towers one that we've done together?
682.		**Milin:**	Um … the dishes and cups. I forget what else, um …
683.		**R1:**	Yeah.
684.		**Milin:**	Was on that one but …
685.	00:53:06	**R1:**	Does this remind you of any of those others? (*He sits down*)
686.		**Milin:**	The ones that we did with the Unifix Cubes but then we had that um thing with candy hearts …
687.	00:53:16	**R1:**	Yeah, yeah.
688.		**Milin:**	A couple of times, um …
689.		**R1:**	Yeah, yeah. But this partic… these Unifix Cube ones? Are they like any other or are they different?
690.		**Milin:**	Just one.
691.		**R1:**	Just on other Unifix Cube one. Yeah I agree with you on that.
692.		**Milin:**	That's it.
693.		**R1:**	Yeah, that's it. Well it's time for you to go to have

			lunch. Will you promise me that you'll try to figure out …
694.		**Milin:**	Okay.
695.		**R1:**	Which the towers of four are so that we can solve that mystery. Okay?
696.		**Milin:**	Uh huh.
697.		**R1:**	Thank you so much Milin.

10.6 TRANSCRIPT – MILIN'S SECOND INDIVIDUAL TASK-BASED

INTERVIEW ON 2/21/92

Line	Time	Name	Transcript
1.		**R1:**	Are we ready? Um-Had you thought anything about what we had talked about? Tell me what you think.
2.		**Milin:**	*(taking blocks in his hands)* The um.....the towers of four are 16.
3.		**R1:**	Oh real—That is what the question that —we hadn't answered yet? Wasn't it—are you sure?
4.		**Milin:**	Ah huh.
5.		**R1:**	How can we be sure?
6.	00:00:47	**Milin:**	Um. ...I tried it.
7.		**R1:**	Oh...Can we, can we get them out? Can you figure how they're supposed to be so you can show me what you did?
8.		**Milin:**	*(Milin is taking out cubes from the large bag and making towers of 4, looking at what he has to check he has the blocks he needs)*
9.		**R1:**	How are we gonna know if whether we have the right ones or not? You have more than 16 already ...*(pointing to the blocks Milin is taking out of the package and counting them)*
10.		**Milin:**	Huh?
11.		**R1:**	How many do we have out here now......Oh....*(pointing to the group of cube towers on the table that are out of the bag)*
12.		**Milin:**	2,4,6,8,10 *(counts softly)*15.....and the 16th one.
13.		**R1:**	Okay—now how am I gonna know that, that we have every one and that they're all different?
14.	00:01:51	**Milin:**	Ah—one thing is, right now I want to check if there's any.....
15.	00:01:56	**R1:**	Yeah, would you check for me? And sorta let's organize them in any way that is good for you—I'm gonna move these (*the large bag of cubes*) over here a little bit so we can see....
16.		**Milin:**	*(positioning the cube towers of 4 he has made on the table in some sort of order)*

Line	Time	Name	Transcript
17.	00:02:39	R1:	What are you—urn—what strategy are you doing right now?
18.		Milin:	Um—how to find everything by—urn—see—-all the yellows turn reds and the reds turn to yellows *(pointing to 2 towers-3 yellow/ 1 red; 3 red/ 1 yellow)* One thing is that these 2 are together because all of them are different *(holding up 2 towers of every other color)* but which every way they are the same. *(raising up 2 towers of all red and all yellow)*
19.		R1:	How do you mean?
20.		Milin:	By see—this and this go together *(comparing 2 towers of opposites)* this and this go together (2 *more opposites-different pattern),* this and this go together (2 *more Opposites-another pattern),* and these 2 go together *(another different pattern).*
21.		R1:	Yeah—they're opposites of each other is that what you mean?
22.		Milin:	Uh huh.
23.		R1:	And is that the way you have decided each of these two up? So that means you have
24.		Milin:	*(counting his paired towers softly) six… eight… 16*
25.		R1:	If you have eight pairs of them....
26.	00:03:36	Milin:	Uh huh…
27.		R1:	Uh—how are, how are we gonna be for sure that we don't have any that are the same and that we have them all?
28.		Milin:	Um....one thing is there's only a couple with ones...*(pointing to 2 towers-3 yellow/1 red; 3 red/1 yellow)*
29.		R1:	How do you mean with "ones"?
30.	00:03:52	Milin:	Like you could build a staircase up to four like that.....
31.		R1:	Show me what you mean....
32.		Milin:	*(building 4 towers of 1 red moving up 1 position in each*

Line	Time	Name	Transcript
			tower of 4 from bottom to top-left to right)
33.	00:04:10	R1:	Oh...okay, so these are the ones with—Oh, I remember that's a part of what this stuff over here was —wasn't it? Ah…and so there's 4…
34.		Milin:	And then remember when I changed my Mind to 16?
35.		R1:	....from 24...
36.		Milin:	Yeah…
37.		R1:	....from 24—I sort of remember that—urn—why did you change your mind?
38.		Milin:	Because—um—see you know when they were on the 5's? There would be about 5 or 6 about of 'em that on the reds that would be made up as a staircase so I took that and I did that with that
39.	00:04:52	R1:	Uh huh....
40.		Milin:	So....
41.		R1:	You did that with five of them?
42.		Milin:	Yeah...uh huh...and I got, I got 16.
43.	00:05:01	R1:	For the fives or the fours?
44.		Milin:	fours.
45.		R1:	For the fours? But before you had said 24....
46.	00:05:10	Milin:	Yeah...
47.		R1:	And you changed your mind?
48.		Milin:	Uh huh...
49.		R1:	Because of these staircases?
50.		Milin:	Yeah.
51.		R1:	Okay-so here was 4 and then—but somehow you said there was eight—why?

Line	Time	Name	Transcript
52.		**Milin:**	Because you can make this way a staircase (3 *yellows/1 red towers group)* and you can make this way a staircase *(3 red/1 yellow towers group)* with yellows and reds.
53.	00:05:32	**R1:**	Do you have that too? Can you show me?
54.		**Milin:**	I'll do it backwards here...
55.		**R1:**	Okay.
56.		**Milin:**	*(Making staircase towers with 1 yellow/3 red, yellow cube changing position. He is placing these towers next to those with 1 red /3 yellow)*
57.		**R1:**	(*Pointing to Milin's towers...)* and you skipped one...(*skipped a stair level in the group of towers)*
58.	00:05:48	**Milin:**	Oh yeah—this goes on the bottom—right here..... (moving towers)
59.		**R1:**	Oh—I see—so this is going to be a go down staircase.
60.		**Milin:**	And after that there are all of them the same...(*adding 2 towers; 1 all yellow, 1 all red at the end of his staircase arrangement)*
61.		**R1:**	And how many of them were these—there were two of those—
62.		**Milin:**	...of these (*holding the 2 solid towers)*
63.		**R1:**	Okay, and so that was what this 2 was...(*pointing to Milin's worksheet paper laying on the table)*
64.		**Milin:**	*Yeah...*
65.		**R1:**	Okay—and so that was the eight and the two and then— what else could you have? This is with one color, one of one color and three of the other and this was all of one color... (*reviewing the staircase towers arrangement on the table)*
66.	00:06:32	**Milin:**	...and three of the other and then I put these two on the sides...(*referring to his all red tower and all yellow tower)*

Line	Time	Name	Transcript
67.		R1:	Sure...
68.		Milin:	Because—see—this, after this (*pointing to second staircase of predominant red)* there's gonna be another staircase but since there's not...
69.		R1:	Uh huh....
70.		Milin:	These should really go in the Middle...*(moving the 2 solid towers in between the 2 different staircases)*
71.		R1:	Well—yeah—whichever...it depends on the sort of—what you are thinking your pattern is—don't you think?
72.	00:06:50	Milin:	Uh huh.
73.		R1:	However, How many of these are there all together? (*pointing to all the towers)*
74.		Milin:	Um... two, four…ten.
75.	00:07:00	R1:	ten. So its ten of those…and two of them were....
76.		Milin:	....were almost the same.
77.		R1:	...and two of them are
78.		Milin:	...are almost the same
79.		R1:	…are all of the one color.
80.		Milin:	You see all of these are the same as these *(arranging the 2 sets of staircase towers}* but, but they are switched by the colors.
81.		R1:	Uh huh—well—what about this—the group over here— what do they have in common? *(pointing to 4 towers: 2 yellow/2 red; 2 red/2 yellow; 1 red/2yellow/1 red; 1 yellow/2 red/1 yellow)*
82.		Milin:	These have in common is that they have some of, most of them have two yellows
83.	00:07:33	R1:	And
84.		Milin:	...and two reds.

Line	Time	Name	Transcript
85.		**R1:**	Most of them?
86.		**Milin:**	Um…all of them, actually.
87.		**R1:**	Do they?
88.		**Milin:**	Uh huh....
89.		**R1:**	Are you sure?
90.		**Milin:**	Uh...huh. *(Grouping in order of opposites)*
91.		**R1:**	Okay, so all of those have two yellows and two reds. What about all these? All of these have...
92.		**Milin:**	They have three yellows and onered on this side *(right side)*
93.		**R1:**	Uh huh...
94.		**Milin:**	-and three reds and one yellow on this side. *(left side)*
95.		**R1:**	Uh huh...and then in the Middle?
96.		**Milin:**	In the Middle are the two ones that—um—are all one color.
97.		**R1:**	Okay, and so you have three of one color and one of the other and then you have four of one color … and you have two and two...is there anything else you can add?
98.	00:08:20	**Milin:**	Ah huh...because if you want four of one color it would be these two be coming into these two—if you want three of this color it would come into these two columns *(pointing to the speci*fic applicable staircase towers) but then on the twos you could only make six.
99.		**R1:**	Uh huh. Why can't you add three of one color and two of another?
100.		**Milin:**	See, if you go together right? *(Arranging the 3 towers of 2 red/2 yellow combinations)* it will go like this… and this… *(2 red/2 yellow;1 yellow/2 red/1 yellow; 2 reds/2 yellows; 1yellow/2 reds/1 yellow; 2 yellow/2 red)*
101.		**R1:**	Oh, I see…so that..*(pointing to the 2 reds together towers)*

Line	Time	Name	Transcript
102.		**Milin:**	So that it'll be three. ..*(pointing to the 3 possible 2 red towers)*
103.		**R1:**	Uh, that means if the reds are together—okay
104.		**Milin:**	...but—um—for yellows together it won't work.
105.	00:09:00	**R1:**	It won't work? You can't do that?
106.		**Milin:**	Because you see—this goes with this and goes up—See? *(showing that the 4th tower of 2 yellow won't allow them to touch each other— a yellow on top and yellow on bottom; placing it at the right of his 2 yellow/2 red)*
107.		**R1:**	Oh, it doesn't do quite the same as this group over here? *(pointing to the 3 red staircase group)*
108.		**Milin:**	...and this here—*(moving the 2/2 combination towers to the right of the yellow/2 red/yellow tower)* See? So...
109.		**R1:**	Uh huh...
110.		**Milin:**	This has to go like this *(from top to bottom—2 yellow/2 red; 1yellow/2 red/I yellow;2 red/2 yellow; 1 red/'2 yellow/1 red; from left to right)*
111.	00:09:14	**R1:**	So you have to choose either yellow or red for each staircase...
112.		**Milin:**	Yes.
113.		**R1:**	And then what about those over there … So how many of these are there that had the staircase thing?
114.		**Milin:**	Only three of them that can make a staircase but then if you want to start all over—you need one more but that'll be this *(still handling the 2 each color combination towers)*
115.		**R1:**	Yeah … you could keep going— goodness! Yeah—
116.	00:09:37	**Milin:**	And—um—these are here because when you do this *(red/ yellow/red/ yellow tower)* it'll be a coming into these two *(placing it next to the all red tower)* but see *(yellow /red/ yellow /red tower)* you want 2 of each-but you are separating them.
117.		**R1:**	Uh huh...

118.		**Milin:**	See—you could put these here *(red separated)* if you want and it'll be the same thing as this…(*yellow/ red/ yellow/red tower)*
119.		**R1:**	Uh, so there's only two—so is that what you are saying? And so altogether?
120.	00:10:01	**Milin:**	They became 16.
121.		**R1:**	And there are not any others?
122.		**Milin:**	Uh huh.
123.		**R1:**	Is that the way you figured it out?
124.	00:10:07	**Milin:**	Uh huh.
125.		**R1:**	And so you said there are 16—Now help me to remember what all this, this… this... this (*pointing to Milin's paper worksheet again)* was about...
126.		**Milin:**	This is for one yellow and four reds-there were five.
127.	00:10:19	**R1:**	This was for the towers of five wasn't it?
128.		**Milin:**	Yeah.
129.		**R1:**	But it was this stuff down here; you said one towers of two? Towers of two?
130.		**Milin:**	...are four.
131.		**R1:**	What does that mean? *(She pulls the bag of blocks over to him)*
132.		**Milin:**	That means...um...(*handling his towers of 4 hesitantly)*
133.	00:10:37	**R1:**	Here are towers of four right here...That is what you added to your paper... I just want to remember what, it's been awhile, I was saying to Amy awhile ago that I really had to get out my copy of your paper to remember what we were, I knew we were talking about so that you had so much that I had to remember what we had been saying...(*Milin has four towers: YY,RR,RY,YR)*

Line	Time	Name	Transcript
134.	00:10:56	**Milin:**	This is supposed to be like this...(*arranges 4 towers of 2*)
135.		**R1:**	Uh huh....
136.		**Milin:**	See? (*holding the towers of 2*)
137.	00:11:00	**R1:**	Oh, I see—so these are the towers of four and there's not any more?
138.		**Milin:**	Uh-huh. Because, I mean, these are the towers of two.
139.		**R1:**	And there are four?
140.		**Milin:**	Because… see, you can't make any more because see, these two. ..(*points to the paired YR and RY*)
141.	00:11:16	**R1:**	Yeah—so it's like those two ones over there so....
142.		**Milin:**	And these two are like exactly like these (*comparing 2 red solid towers of 2 and 2 solid towers of 4*)
143.		**R1:**	Yeah— uh— okay, and so there is only four and then what, what's this next line you said?
144.	00:11:30	**Milin:**	Of one's are...
145.		**R1:**	You said towers of ones are two—what does that mean? (*His towers of 2 now lay in YR, RR, YY, RY order*)
146.		**Milin:**	Exactly (*holding up 2 towers of 1—1 yellow; 1 red*)
147.		**R1:**	Oh...okay, so you had towers of one were these guys? (*separating these towers of 1*)
148.		**Milin:**	Yeah— because— see— you can't make any other design like this (*holding up a patterned tower of 2*)
149.	00:11:48	**R1:**	Uh huh—and then you had towers of two and there were four of them (*pointing to the different groups of towers*) and then over here you had towers of four and how many did we have? Then over here you had towers of four...and how many did we have? (*showing the towers of 4*)
150.	00:12:08	**Milin:**	16
151.		**R1:**	We had 16 of them and we had them lined up in all sorts of

Line	Time	Name	Transcript
			different ways *(towers arranged)* but I'm going to put them right here -for right now...what was the other...did we...what was in between?
152.		**Milin:**	Um...the two um all reds and all yellows.
153.	00:12:24	**R1:**	Yeah...wel1...yeah, I know that. But here's towers of two, towers of one, towers of two, and towers of four...*(pointing to his constructed towers respectively)*
154.	00:12:32	**Milin:**	Towers of three are eight.
155.		**R1:**	Really?
156.		**Milin:**	Uh huh.
157.		**R1:**	Did that really work?
158.		**Milin:**	Ah huh...we tried it out in here.
159.		**R1:**	And there were eight?
160.	00:12:41	**Milin:**	Ah huh...*(deep sigh)* *(Milin reaches -for the bag and begins to pull more blocks deliberately to create the towers)*
161.	00:12:53	**R1:**	I see you're using the same ideas...mm...mmm.
162.		**Milin:**	*Milin has already placed 2 towers of 3 with all red and yellows in each)*
163.		**R1:**	Well, there's four of them.
164.		**Milin:**	*(Referring to 2 all red and all yellow, red-yel1ow-red and yellow-red-yellow)*
165.		**R1:**	*(Milin continues to builds 2 red-1 yellow, 2 yellow-1 red)*
166.	00:13:24	**Milin:**	Then there's... *(Continues bui1ding)*...oops.
167.	00:13:33	**R1:**	Oops. *(a couple blocks shift)*
168.	00:13:36	**Milin:**	Bottom. . *(places 1 red on the bottom of 2 yel1ow)*...that goes on the bottom *(whispering to himself)*...Here are all eight *(displaying his towers)* See, these two -fall into the same hands... because *(stands up the towers of 2 red-1 yellow, 2 yellow-1 red, 1 red-2 yellow, 1 yellow-2 red)*

Line	Time	Name	Transcript
169.	00:13:54	**R1:**	Tell me what you mean.
170.		**Milin:**	These two groups.. .because.. .see... if you go like this...*(turns one paired group over to match up the colors)*
171.		**R1:**	*(chuckles)* Oh, they're Just standing on the heads, yeah.
172.	00:14:04	**Milin:**	They'll be the same...these two would be the same...*(points to the top of one yellow-two red and two red-one yellow)*
173.		**R1:**	So, they remind you of each other.
174.		**Milin:**	Yeah.
175.		**R1:**	Yeah.
176.		**Milin:**	But, if you flip it over, they'll both be different. So...
177.		**R1:**	Yeah... Yeah.
178.	00:14:12	**Milin:**	...that's what I always work on *(mumbling)*
179.		**R1:**	Yeah...yeah, in that kind of way...oh really, did...that was no?
180.		**Milin:**	Uh huh, but then there's also these two. *(Shows yellow-red-yellow and red-yellow-red)*
181.		**R1:**	Uh huh. ...
182.		**Milin:**	… but they don't fall into hands but these and these two. (*all yellow and all red)* These fall into the same hands as these, *(picks up 2 towers of all red and all yellow to compare with the all red and all yellow towers of 4)*
183.		**R1:**	Yeah...those are in every group, aren't they?
184.		**Milin:**	Uh huh.
185.		**R1:**	Yeah
186.	00:14:34	**Milin:**	Except for zeros!
187.		**R1:**	Except for zeros. What could we do with zeros? Okay, and you when in your classroom, when you did towers of five, you said there were 32. *(Pointing to his paperwork)*

Line	Time	Name	Transcript
188.	00:14:44	**Milin:**	Uh
189.		**R1:**	Suppose I ask you to guess about towers of six.
190.		**Milin:**	*(Thinks -for about 8 seconds)* Around forty -something.
191.	00:14:55	**R1:**	You think forty- something.
192.		**Milin:**	Uh hum.
193.		**R1:**	Yeah, yeah...Let's...
194.		**Milin:**	*(Reaches for his already built towers)* My guess would be thirty or forty something because...
195.	00:15:04	**R1:**	You got 32 -for five *(she is lining up his towers of 3)* ...um have you …that's interesting, how many of them were here? *(points to towers of 1 with 2 colors)*
196.		**Milin:**	two...and then here are four *(points to towers of 2 with 2 colors)*...and here are eight *(has his hand over towers of 3)*
197.		**R1:**	Uh huh.
198.		**Milin:**	*(Reaches over to the towers of 4 with 2 colors)* And here is a big group of 16...and then there's even a bigger group of fives. *(points to his paper work)*
199.		**R1:**	Which is how much?
200.	00:15:30	**Milin:**	32...and six, whew, that's even a bigger group... because…see...urn...everyone is smaller because...see if I had a seven one *(takes a large stack of all reds from the side and counts to make sure it has 7)*...a seven one like this . . .
201.		**R1:**	Uh huh.
202.		**Milin:**	It would be, um, more than sixes...
203.	00:15:57	**R1:**	Uh hum.
204.		**Milin:**	...in all of these because it has more and you could change more stuff on it. *(reaches for a yellow to demonstrate)*

Line	Time	Name	Transcript
205.		R1:	Mm hum... ah hum . . ,uh . . .
206.		Milin:	You could build, you could build a bigger staircase
207.		R1:	Sure, you could build bigger staircases and all kinds of things. Um...that's really interesting .. .um, if you were going to go from towers of, well from, towers of one and make them into towers of two? *(points to towers of 1)* How would you do that?
208.	00:16:33	Milin:	Simple.
209.		R1:	Yeah, what?
210.		Milin:	You put one tower on top of the other. *(Smiling)*
211.		R1:	Is that the only way you could've gone from a tower of one to a tower of two?
212.		Milin:	Yup!
213.		R1:	Okay, which one are you going to choose for the bottom
214.		Milin:	*(Chooses the yellow as he builds a tower of 2)* Here it is! *(Places it next to the same patterned tower of 2 in the already built group)*
215.	00:16:50	R1:	Oh yeah! Well, that's Just one though! That's, that's, that's wrong though! *(picking up his tower)* That means that if you went from a tower of one to a tower of two, you'd only have one. You told me there were four...I wonder about that...see? Does this remind you of any of the other problems that you've ever done?
216.		Milin:	Urn...maybe the one where in second grade you were using Unifix cubes.
217.		R1:	Yeah...yeah...second grade or third grade...yeah, mmm...or something like yeah...when you were using Unifix cubes and you were building the same kinds of towers. If you would going to...
218.		Milin:	Yeah, but we had three colors, but…
219.		R1:	Oh really. So you could do it with three colors couldn't you?

Line	Time	Name	Transcript
220.		**Milin:**	Uh huh.
221.		**R1:**	Instead of with two. Would that make it different?
222.		**Milin:**	Uh huh... if there's three colors then you could make, um three of these *(holds up a tower of one color),* three of these… .there would probably be eight more for the fours.
223.	00:17:43	**R1:**	You think?
224.		**Milin:**	Uh huh.
225.		**R1:**	There Might be eight more, why?
226.		**Milin:**	Hmm...just a lucky guess.
227.		**R1:**	How many more would there be for...the ones?
228.	00:17:54	**Milin:**	One more. *(chuckles)*
229.		**R1:**	Why?
230.		**Milin:**	Give me one more color?
231.		**R1:**	*(She hands him white unifix cubes. He immediately pulls one cube and places it next to the towers of 1 yellow and 1 red)*
232.	00:18:02	**Milin:**	…one more tower. *(chuckles)*
233.		**R1:**	Uh hmm. What about for the twos?
234.		**Milin:**	Twos... *(he continues to pull more white Unifix cubes to build a tower of 2 of all whites)* There would be this falling into the same hands. *(places his white tower of 2 next to the towers of 2 of a11 yellow and all red)* There's going to be a lot more twos, I'll tell you that.
235.	00:18:20	**R1:**	You think?
236.		**Milin:**	*(He continues to build) (Speaking to himself)*...put a red on top of that...*(being a white. He places it next to a tower of 2 with white on the bottom and yellow on the top, as well as a tower of yellow-red)*...by this there'll be pairs of three. *(chuckles)*

Line	Time	Name	Transcript
237.	00:18:41	R1:	What do you mean?
238.		Milin:	See. . .because .. .see ... *(pulls his towers of 2 with white-yellow and white-red)*... on this there'd have to be a pair of three somehow, *(he pulls over a tower of 2 with yellow-red and places it next to the white-red)*
239.		R1:	Hmmm.
240.	00:18:50	Milin:	This would -fall into the same kind of hands, at least, pairs of three...
241.		R1:	Hmm...hmm.
242.		Milin:	Then this *(a tower of red-yellow)*, there's going to be more...like this *(a yellow-white)*, and ...*(continues building a red-yellow)*
243.	00:19:07	R1:	How many do you think they're gonna be?
244.		Milin:	Phew...hmm...around ten.
245.		R1:	You think...yeah.
246.	00:19:16	Milin:	That's a lot more than four
247.		R1:	Uh huh.
248.		Milin:	*(While pointing to his towers of 2, whispers his count)* two, four, six,eight, t...nine. Well, this would be an even or odd number. These two would -fall into the same exact hands. *(pulls the pair of yellow-red and red-yellow away from the group)*
249.		R1:	Uh hmm. Yeah, you had them already. Yeah.
250.	00:19:39	Milin:	These two...*(he continues to group towers together according to their patterns. Looks at the white—yellow and red-yellow, then leaves them)*...oh...
251.		R1:	Do you have them all or not?
252.		Milin:	These two...*(pulls the yellow-white and white-yellow)*, these (pulls the white-red and red-white)...

Line	Time	Name	Transcript
253.		R1:	How are you going to tell whether you have them all or not?
254.	00:19:50	Milin:	S...um, one thing is... (*goes -for more cubes as he looks back at his already built towers*)...I could keep on building.
255.		R1:	Yeah, and make 'em work, yeah.
256.		Milin:	(*He continues to build*)
257.		R1:	(*reaching for Milin's towers*) Is there were three that were in towers of one...
258.	00:20:02	Milin:	(*looks at his towers of 1 with 3 colors*) If they had this... (*gestures towards his group of towers of 2 with 3 colors*) there'll be two, four, six eight,...nine for this, and I'm sure of that!
259.		R1:	You're sure of that. You're sure you have them all?
260.		Milin:	Uh hmm.. .because
261.	00:20:14	R1:	Why?
262.		Milin:	See, you know when we had two? we times it...if you times… it by two, you'd have four just like on this. (*refers to the towers of 2 near him*)
263.		R1:	Uh huh.
264.		Milin:	But if you had three you could times it by two and you have...(*counts his towers of 2 with 3 colors*)..two, four, six...(*stops*)
265.		R1:	You times it by two?
266.		Milin:	But, I mean by three, because see, there's three of these (*holds up his towers of 1 of 3 colors*)... two, four, six eight,...nine. (*counts his towers of 2 of 3 colors again*)
267.	00:20:37	R1:	Oh! That's really interesting. So what's you're saying is that for the twos...(*takes a paper and pen to write*)
268.		Milin:	Uh huh.
269.		R1:	You times it by two...can you write that down so I can

Line	Time	Name	Transcript
			remember it?
270.		**Milin:**	*(Milin takes the pen and begins writing down his explanation)*
271.	00:20:54	**R1:**	Actually, why don't you use this one so we could see it better on the camera? *(Milin switches to a felt pen)*
272.		**Milin:**	I'll write right over it?
273.		**R1:**	Yeah. With so many towers it hard to find room to write .
274.	00:21:06	**Milin:**	Here *(hands her the paper)*
275.		**R1:**	Okay, and then what?
276.		**Milin:**	*(pulls back the paper)* And then there's three times three... nine, because...
277.		**R1:**	Okay, okay, now these were for the towers that were how high, two high?
278.		**Milin:**	Uh huh. And so are these, but that's with this third. *(holds up the towers of 1 with 3 colors)*
279.		**R1:**	Oh, with the third one. Okay. So it was two times two was four. *(points to his paper work)*
280.	00:21:28	**Milin:**	Uh huh. See... you know on sixes I'm going to do what I did with the fours and more...um...I'll try to do six times six...and that'll be...
281.		**R1:**	And that would be how much?
282.	00:21:42	**Milin:**	Three-six...but it's going to be more than that.
283.		**R1:**	Yeah because you already had 32.
284.		**Milin:**	Yeah, see. I just keep on doing that and *(they speak simultaneously)* make sure they'll be more than that.
285.		**R1:**	Okay, yeah . . . I think so...Now for the towers of three...with two colors...was how many? *(She pulls over sample towers)*
286.	00:22:06	**Milin:**	...um...I think about eight.

Line	Time	Name	Transcript
287.		**R1:**	*(has the towers grouped)* I think exactly eight. We've seem to have gotten an extra. Which one's extra?
288.		**Milin:**	Let me see. *(Removes the tower of 3 with all red)*
289.		**R1:**	Oh, that red one...yeah...okay.
290.		**Milin:**	Oh yeah, this was that I was using for all of 'em.
291.		**R1:**	Oh...using it to build them. Okay, and so -for towers of two it was four.
292.		**Milin:**	Uh huh.
293.		**R1:**	And for towers of two that were three colors it was nine. *(she refers to his paper and pen work as she speaks)*
294.		**Milin:**	Uh huh.
295.		**R1:**	And for towers of three with two colors...
296.	00:22:38	**Milin:**	...um, it was eight. It would've been near nine so...
297.		**R1:**	...had to be near nine.
298.		**Milin:**	...but, it was eight.
299.		**R1:**	Yeah, it was eight. If you had to guess if you were gonna make towers of three that were three color?
300.	00:23:07	**Milin:**	Uh huh...I'd guess around...(*thinks for 9 seconds*). .seventeen.
301.		**R1:**	You think seven...Where'd you get that?
302.		**Milin:**	Out of the air!
303.		**R1:**	Oh, I know it, but if you had to, well...I bet you didn't get it out of the air. I bet you were thinking somehow. Where did that seventeen come from?
304.	00:23:20	**Milin:**	Well, it would be an odd number because of this. *(shows his tower of 2 with 3 colors)* I thought it would be an odd number.
305.		**R1:**	It's gonna, it's gonna be an odd number because of what?

Line	Time	Name	Transcript
306.		Milin:	Because of this and this. *(groups his towers of 2 more closely)*
307.		R1:	Okay, because this was three and then nine.
308.		Milin:	If this was a city, it's all made up of twos, but there's three colors.
309.		R1:	Uh huh.
310.		Milin:	And you were asking me of three colors of three...see. *(refers to the towers)*
311.	00:23:47	R1:	Uh huh.
312.		Milin:	But then I got this. *(towers of 2 with 3 colors)* Instead I took this *(towers of 3 with 2 colors)* and I times it by two and added one more because of this. *(picks up a few white)* I actually just pulled it out of the air.
313.		R1:	Oh, is that how you got it?
314.		Milin:	Yeah!
315.		R1:	Well, that's not out of the air, that's a pretty good guess. You times this by two and added one.
316.	00:24:11	Milin:	I could've subtracted one but...
317.		R1:	Um…So that's how you got your 17. It was kind of a guess
318.		Milin:	Which one should I do? Which one should I do?...So, I just pulled it out of the air that number 17 or 15.
319.		R1:	Okay, so why don't we write down 17 or 15; that would be towers of three with three colors... *(writes down number by multiplication}* Maybe you better put a name there because you know how hard it is for me to remember. I just know with towers of 3. Okay...*(writes down his answers)*
320.		Milin:	Tower of two and this is towers of three. *(Refers to paper work)*
321.	00:24:49	R1:	Um..um… and towers of three for two colors was eught? Is that right?

Line	Time	Name	Transcript
322.		**Milin:**	Yeah.
323.		**R1:**	Yeah.
324.	00:25:00	**Milin:**	eight…put a little box around it and a bigger one in case you need it. *(diagrams on paper)*
325.		**R1:**	Yeah…um…This is sort of....don't you think these are sort of interesting to try to figure out? Do you think...do you think there's a way to figure it out?
326.		**Milin:**	Uh-huh if you take ten hours of your time of course. (*estimates time and chuckles*)
327.		**R1:**	If you take ten hours of your time.......Ah—okay, okay—and so towers of two....
328.	00:25:29	**Milin:**	I found the towers of four in about....three Minutes.
329.		**R1:**	That was quick wasn't it? And it was 16.....
330.		**Milin:**	My guess.......
331.	00:25:39	**R1:**	It was 16, yeah. And so the towers of five were 32. Which would be the interesting problem to work on next in terms of what you're thinking about? Would you rather try to find towers of three in three colors?
332.		**Milin:**	Uh uh....towers of three in ten colors.
333.		**R1:**	Oh!" *(gasping)*
334.		**Milin:**	No...towers of ten in three colors.
335.		**R1:**	Towers of ten in three colors....
336.		**Milin:**	Well, that would be about the same.
337.	00:26:08	**R1:**	As towers of three in ten......
338.		**Milin:**	Umm.......
339.		**R1:**	But you're saying you'd think there'd be 17 towers of three in-

Line	Time	Name	Transcript
340.		**Milin:**	three colors
341.		**R1:**	three colors and you think there would be how many towers of six in two colors?
342.	00:26:28	**Milin:**	six in two colors? Umm
343.		**R1:**	How many were there for five in two colors?
344.		**Milin:**	32. ...*(thinks for awhile)*....45 *(referring to the question of 6 of 2 colors)*
345.	00:26:46	**R1:**	You think 45, were did you get that one?
346.		**Milin:**	Out of the air.
347.		**R1:**	You don't get things out of the air. Where did you get the 45?
348.		**Milin:**	One thing is.....
349.		**R1:**	*(writing on a paper while Milin watches on)* one, two, three, four
350.		**Milin:**	Fives.
351.		**R1:**	Is this going to be an odd number or an even number?
352.		**Milin:**	Odd. *(Whispers)* 45.
353.		**R1:**	For towers of, towers of two colors?
354.		**Milin:**	No, not um, I mean, um, 46. *(Holding his hand up towards his head—shaking his head back and forth)*
355.		**R1:**	Why did you change your Mind? Why did it have...do you think is has to be even?
356.		**Milin:**	*(Shaking his head)* I mean 44.
357.		**R1:**	Do you think it has to be even?
358.	00:27:24	**Milin:**	Yeah!
359.		**R1:**	Why?

Line	Time	Name	Transcript
360.		**Milin:**	Because two is an even number and, um, it's got to be even because you can make pairs of them-but, it you had three you can't make pairs of them because of this. *(Holds up a 3 cubes of different colors)* If you make pairs of them there'll be in twos maybe. But these three would make a difference! *(points to cubes)*
361.	00:27:44	**R1:**	Uh, the three originals will always make a difference. Yeah, okay, do you know what? I think we're going to come back again. Can I leave you with two problems?
362.		**Milin:**	Okay.
363.		**R1:**	Okay...and it'll probably be awhile. Don't you think a couple of weeks or so before we come back *(talking to Amy in background)* What are the two problems that I want to know? What do you think?
364.	00:28:05	**Milin:**	How many of threes with three colors and
365.		**R1:**	Okay, can I write that down for you.
366.		**Milin:**	and six with two colors.
367.		**R1:**	Um..um...
368.	00:28:16	**Milin:**	That's the thing that we didn't figure out. So......
369.		**R1:**	Yeah, those are the next ones *(writing)*. How many towers of three high.... isn't that right? using.....
370.		**Milin:**	um....three colors.
371.		**R1:**	three colors, and you guessed?
372.		**Milin:**	*(yawns)* Um, I guess that....
373.	00:28:42	**R1:**	Either 15 or 17.
374.		**Milin:**	15 or 17.
375.		**R1:**	If you had to go with one of those?
376.		**Milin:**	15 *(chuckling)*
377.		**R1:**	Okay ...and I wanna say or 17. Okay, now that's question

Line	Time	Name	Transcript
			number one. What is question number two?
378.		Milin:	Um...about two—two colors for ix...but if it was one color of six that would be easy, just two.
379.	00:29:12	R1:	You're right… is that always going to be true?
380.		Milin:	Well, if there's one color for anything it'll just be one.
381.		R1:	Yeah… how many towers of 6 high using....
382.	00:29:30	Milin:	two colors.
383.		R1:	two colors and what was your last guess?
384.		Milin:	That was....45.
385.	00:29:38	R1:	Really? Okay, you guessed 45. That was towers with two colors that was six high. Okay, now I'm going to let you take *(she looks over the papers as Amy Martino lets her know what cubes he can take)* Okay, um, maybe I'll give him—that one. Then this is my picture of what you did last time, remember?
386.		Milin:	Ah huh.
387.	00:30:15	R1:	Okay, it says Milin 2/7/92. What did you add to it before you came back in?
388.		Milin:	Um....after that?
389.		R1:	Yeah, what's the one thing that you put on there-.what's the difference between my paper and your paper?
390.		Milin:	Um......I put towers of four, are 16
391.		R1:	Okay, can you add that to Mine so I can keep record of what we've done? *(Milin adds to the paper)* Okay, so that ones for me and I'm going to let you keep this one and this one. Now, what did, what did we learn? What did we do today? We said that... what was this four and nine stuff up here? *(She holds up his work paper to question him as he begins to explain. He is handling a piece of folded paper as she talks, leaning on the table}*
392.	00:31:12	Milin:	That I put three times three for three colors of two, and that

Line	Time	Name	Transcript
			would be nine, and two times tow for the one before that; and it would still come up with four.
393.		R1:	Okay, that was the towers of two with two colors and towers of two with three colors *(gesturing towards his built towers);* and this was your guess *(pointing towards his written work).* Can I keep this? Ok, that's mine
394.		Milin:	Yeah.
395.	00:31:39	R1:	Now I'm going to just write down on the bottom, uh, this one, so I can remember our two questions of two with three colors, is that right?... and how many towers.......Do you ever write?
396.		Milin:	Huh?
397.		R1:	How many towers of
398.		Milin:	six
399.		R1:	What six? six with two colors-Do you ever keep records when you do these?
400.		Milin:	Uh huh.....
401.		R1:	Sometimes use a pencil and do with it......What are you going to need?
402.	00:32:21	Milin:	Well, I usually put it on the computer I have.
403.		R1:	Do you really? I did not know you could do that. What are you going to need to take some of this stuff home?
404.		Milin:	I am going to need another color.
405.		R1:	You're going to need another color.
406.	00:32:31	Milin:	And I'm going to need a lot more cubes
407.		R1:	You think? Okay, well what I'm going to do because I didn't give you very many of.....okay, you can use the red and the yellow to do this one *(the towers of 6 with 2)*
408.		Milin:	Yeah.
409.		R1:	Okay.

Line	Time	Name	Transcript
410.		**Milin:**	But, then I am going to need the red and yellow to do this one *(pointing to the towers of white she is holding)*
411.	00:32:58	**R1:**	Um..hm... But you may not have to keep them all. You can maybe....you can draw pictures of something.....You can use them over.
412.		**Milin:**	Or I...actually, can I keep these with me? *(holding up his towers of 3 with 2 cubes, showing more enthusiasm and energy)*
413.		**R1:**	Sure.
414.	00:33:09	**Milin:**	So I'd have to do these.
415.		**R1:**	Those are the towers of 3, so you're not going to have to start over again...okay, why don't you put them back in?
416.		**Amy:**	Do you need another color here? Sure, if you don't mind let me get you some more
417.		**R1:**	Is that okay Amy?
418.		**Amy:**	Oh sure.
419.		**R1:**	If he takes some....okay, what he's decided he needs to keep is his towers of 3 in 2 colors, so he doesn't have to make them over again. Would you have the same ones?
420.		**Milin:**	Um...yes because, and then I would, I, uh...put it— these with the reds and then these with the yellows *(pointing to the towers of all white she holds in her hand)* So we'll need a little more than that.
421.		**R1:**	But you have some, yeah.
422.		**Milin:**	And then....*(begins to play with his folded paper)*
423.		**R1:**	And so your strategy would be to start with these and then do some of
424.	00:33:57	**Milin:**	.....make towers
425.		**R1:**	And make towers and then make some with these *(the white)*...and then make some with yellows...okay....alright,

Line	Time	Name	Transcript
			so when we come back...
426.		**Milin:**	And these *(places his work papers inside)*
427.	00:34:10	**R1:**	If you run out I'll bet Mrs. Barns could always loan you a few more.... don't you think? Or could help you get some more. I think you have enough.
428.		**Milin:**	Okay.
429.	00:34:24	**R1:**	Okay. Thank you very much Milin, I'll see you in a couple of weeks.

10.7 TRANSCRIPT – MILIN'S THIRD INDIVIDUAL TASK-BASED

INTERVIEW ON 3/6/92

Line	Time	Name	Transcript
1.		**R1:**	How many different... what have we done… before
2.		**Milin:**	Um we…we did
3.		**R1:**	And maybe we can do it in some kind of order so that I can remember. I have some notes from what you've done too.
4.		**Milin:**	First of all we did towers of five and then we also did
5.		**R1:**	So you did towers of five
6.		**Milin:**	Yeah
7.		**R1:**	How many of them were there?
8.		**Milin:**	Um…32
9.		**R1:**	Yeah
10.		**Milin:**	Towers of four were sixteen
11.		**R1:**	Towers of four were- maybe you could keep this *(R1hands Milin the pen)* Maybe I'd like to have it in some sort so that I can think about it when we are doing here *(Milin takes the paper)* Towers of four…
12.		**Milin:**	Towers of three somewhere here *(Milin looks at his original paper)* are eight *(Milin makes a column with 3 and 8 on the other paper)*
13.		**R1:**	Um how do you know?
14.		**Milin:**	'Cause its right here. *(Milin points to the original paper)*
15.		**R1:**	Yeah I know it. Um do you know Amy I really might want some more blocks. Can I- can you, can you bring-
16.		**R3:**	Any particular color?
17.		**R1:**	Uh, just towers of just two colors. Maybe not red and black cause he's got red. black and uh-
18.		**R3:**	How about white?
19.		**R1:**	Uh he's got white too

20.		**R3:**	Oh he's got white?
21.		**R1:**	Uh uh Blue and-
22.		**Milin:**	Blue and black
23.		**R1:**	Blue and black would be great.
24.		**R3:**	You'd like blue and back?
25.		**R1:**	It doesn't make any difference. Just something we don't have. Blue and black would be great. Light blue.
26.		**R3:**	Light blue I think
27.		**R1:**	Uh huh
28.		**Milin:**	Dark blue
29.		**R1:**	Well dark blue and black are so much alike, maybe if we put them on the camera we can't see them. Okay, I am concerned at how you knew when you had everything. Okay, but let's keep going with that with that thing. Towers of three you said there were eight *(R1 points to eight on Milin's paper)*. You did towers of two sometime didn't you? *(R1 points to Milin's original paper)*
30.		**Milin:**	Two must be around four.
31.		**R1:**	You think? Let's see *(R1 picks up Milin's original paper and points to it)*
32.		**Milin:**	Yeah
33.		**R1:**	Hey, you guessed it *(Milin makes a column with 2 and 4 on paper)*
34.		**Milin:**	Towers of one, one.
35.		**R1:**	Really?
36.		**Milin:**	No two, actually two.
37.		**R1:**	What would they be?
38.		**Milin:**	One block of red *(Milin holds up his thumb on one hand)*

Line	Time	Name	Transcript
39.	00:01:31	**R1:**	Uh huh
40.		**Milin:**	And one block of yellow *(Milin writes a one on his paper with a line on his paper)*
41.		**R1:**	Uh huh, except that if we were doing blue and black…*(Milin puts a block of blue and a block of black on the table)* okay, so these are the towers of one.
42.		**Milin:**	Uh huh
43.		**R1:**	Okay if I had towers of one, what would the towers of two look like?...*(Milin starts to build towers of two using towers of one as the bottom block)* Is that All? *(Milin shakes his head)* Here, wait just a minute *(R1 puts back the tower of one)* Okay. *(Milin builds the remaining two towers of two using the towers of one as the bottom block)* Let's now keep no, those are, those are my towers of one. You keep taking them away. Okay….okay here are the towers of one? *(R1 puts back the tower of one)*
44.		**Milin:**	Uh huh
45.	00:02:18	**R1:**	Okay and here's the towers of two *(R1moves towers of two into a line)*
46.		**Milin:**	Uh huh *(Milin nods head. Then pushes on top of one of the towers of two)*
47.		**R1:**	Why did that happen?
48.		**Milin:**	Um, this happened because you had to put something else on top of these *(Milin points to towers of one)*
49.		**R1:**	What do you mean you had to put something else on top of these?
50.		**Milin:**	Because you have to put something else on top of these- these two *(Milin picks up a tower of one)* to make another tower of two because it's gotta be two. *(Milin picks up one of the towers of two)*
51.		**R1:**	Oh, okay, and so you had to put – it's like you had, you had, one, one story *(R1 points to towers of one)* and you had to put something else on top of it. What could you put?

Line	Time	Name	Transcript
52.	00:02:49	**Milin:**	Uh, if you had blue *(Milin picks up blue tower of one)* you could put another blue
53.		**R1:**	Uh huh
54.		**Milin:**	Or a black on it *(Milin moves the blue tower of one by the blue black tower of two)*
55.		**R1:**	Show me those
56.		**Milin:**	See *(Milin points to the blue/black tower and moves the blue/blue tower over it)*
57.		**R1:**	You could put another blue
58.		**Milin:**	This and this and black you could put a blue or a black on *(Milin moves black tower of one and two towers of two with black bottom together)*
59.	00:03:05	**R1:**	Oh, and so when you had towers of one and you went to towers of two *(R1 points to the set of towers)*
60.		**Milin:**	Uh huh
61.		**R1:**	Could you have done anything else?
62.	00:03:13	**Milin:**	Uh huh because there's not enough unifix cubes for this *(Milin picks up the set of towers with a black bottom)*
63.		**R1:**	Well even if there were more unifix … what do you mean?
64.	00:03:21	**Milin:**	Like if there were three, then three and for two they'll be around six or eight or something like that.
65.		**R1:**	What do you think for three?
66.	00:03:31	**Milin:**	Let's see, you could have these *(Milin puts his hand over the set of towers with blue bottom)*
67.		**R1:**	Okay, here you've your towers of one. *(R1 moves the towers of one away from the towers of two)*
68.		**Milin:**	Okay you could have these four
69.		**R1:**	Um

Line	Time	Name	Transcript
70.		**Milin:**	Another four *(Milin encloses the towers of two between his two hands)*
71.		**R1:**	I don't understand what you're saying
72.	00:03:42	**Milin:**	Because you could have… if it was using white *(Milin picks up towers of two with blue bottom)* you could have white on this or
73.	00:03:46	**R1:**	No, no we're not going to another color. We've still just got two colors. And we've got towers. Here's the towers of *(R1 points to the towers of two)* here's the towers of one *(R1 starts to move the towers of one)* and you said that went to this and this went to this. *(R1 moves the towers of one closer to the sets of towers of two)*. Is that right?
74.	00:04:00	**Milin:**	Because this is the black here *(Milin moves the black tower of one to the other side of the towers of two)*
75.		**R1:**	Uh huh
76.		**Milin:**	For both of these and this is the blue here *(Milin moves the blue tower of one to the other side of the towers of two)* for both of these.
77.	00:04:07	**R1:**	Uh huh, okay, let's keep it on that side *(R1moves towers of one back where they were)* because then I can think about it. Now uh, that was towers of two. *(Milin picks up the pen)*. There were four *(R1 points to the column with 2 and 4 on Milin's paper)* now what did you say about, oh sure. What about towers of three? *(R1 points to column with 3 and 8 on Milin's paper)*.
78.	00:04:18	**Milin:**	Eight
79.		**R1:**	Why?
80.		**Milin:**	Eight is because you can't get any more.
81.	00:04:24	**R1:**	Why?
82.		**Milin:**	Cause, uh
83.		**R1:**	If you had these for towers of two *(R1 points to towers of two)* then you went to the towers of three.

84.		**Milin:**	You could always put another one on top of that. *(Milin points to the towers of two)*
85.	00:04:40	**R1:**	Explain
86.		**Milin:**	See, *(Milin picks up a blue cube)* just put another one on top of this, this, this *(Milin moves the blue block over towers of two)*
87.	00:04:45	**R1:**	Okay, let's show me how you could do it. But, don't let's tear up those. Okay, here's this one *(R1 takes a new tower of two blues and puts it on the table and then points to the original tower with two blues)*
88.		**Milin:**	And one more *(Milin puts another blue cube on top of the two blues)*
89.	00:04:53	**R1:**	Okay
90.		**Milin:**	Two blacks *(Milin takes a tower of two blacks)* and one more *(Milin puts one more black cube on top)*
91.		**R1:**	*(R1 moves towers of three blue blocks towards the other towers)* I'm confused. You said you had uh the two blues here. *(R1 points to the tower of two blues)*
92.		**Milin:**	Uh huh
93.		**R1:**	And you put a
94.		**Milin:**	Now three blues *(both point to towers of three blues)*
95.		**R1:**	And three blues
96.		**Milin:**	For this one *(he points to his paper)*
97.		**R1:**	Okay
98.		**Milin:**	See? *(Milin picks up tower of three blacks and points to the tower of two blacks)*
99.		**R1:**	Yeah
100.		**Milin:**	This *(he picks up black tower of one)*

Line	Time	Name	Transcript
101.	00:05:11	**R1:**	Now don't take away that tower of one.
102.		**Milin:**	Right *(Milin shakes his head and puts back the tower of one)*
103.		**R1:**	I don't want to forget
104.	00:05:16	**Milin:**	Then this *(Milin makes a black /blue tower and holds it up)* see
105.		**R1:**	Oh
106.		**Milin:**	For that *(Milin points to the original black/blue tower)*
107.		**R1:**	Uh huh
108.		**Milin:**	Put another one on top of that. *(Milin puts another blue cube on top of his new tower and places it on the table next to three blacks)*
109.	00:05:27	**R1:**	Okay, so this one grew to be this one. This one grew to be this one. This one grew to be this one. *(R1 moves the towers of two and three together and spreads them out)* Wait, we need another one for that. *(R1 points to the tower of two that is not paired with a tower of three)*
110.		**Milin:**	*(Milin builds another tower with blue/black/black)* see the duplicate of this is that *(Milin holds the tower he just built next to black/blue/blue tower)* so it goes here. *(Milin puts the blue/black/black tower into the empty space).*
111.	00:05:50	**R1:**	Uh, okay *(Milin knocks over the black/black/black tower of three then picks it up along with the black/black tower of two and reverses position with blue/black and blue/ blue/ black towers).* Okay, what we're doing *(unintelligible).* Okay, now wait. Uh, so this one turned into this one. *(R1 points to the black/blue tower and then the black/blue/blue tower).* Could it have turned into anything else? *(R1 points to black/blue turning into black/ blue/ blue)*
112.		**Milin:**	Uh huh *(Milin nods his head)*
113.		**R1:**	What
114.	00:06:00	**Milin:**	It could have turned into black/blue and another black. *(Milin builds a tower with black/blue/black)*

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Line	Time	Name	Transcript
115.		**R1:**	Uh huh
116.	00:06:12	**Milin:**	See, cause that black is still down there *(Milin points to the black tower of one)* and the blue is still in the middle.
117.		**R1:**	Oh, what do you mean that black is still down there?
118.	00:06:18	**Milin:**	This one and the blue is still in the middle. *(Milin points to black/blue tower of two and then puts black/blue/black tower down next to black/blue/blue tower knocking over some of the other towers in the process)*
119.		**R1:**	Uh huh… uh, oh, okay, *(R1 touches the two towers of three with the black bottoms)* and so could it have turned into anything else?
120.		**Milin:**	Um
121.	00:06:28	**R1:**	Could this tower *(R1 points to black/blue tower of two and the two corresponding towers of three)* have become anything different?
122.		**Milin:**	Uh, uh *(Milin shakes his head)*
123.		**R1:**	With just two colors?
124.	00:06:34	**Milin:**	But, this one *(Milin points to blue/black/black tower of three)* would be something like it, because
125.		**R1:**	Um, how do you mean?
126.	00:06:39	**Milin:**	This - this *(Milin builds a blue/black/blue tower)* see is a duplicate of this *(Milin holds the tower he just built next to the black/blue/black tower)*
127.		**R1:**	Uh huh
128.	00:06:45	**Milin:**	Has to go on this one. *(Milin puts the tower he just built next to the blue/black/black tower)*
129.		**R1:**	Uh huh, uh huh, okay, so these are the towers of three.
130.	00:06:55	**Milin:**	Yeah, and still on that
131.		**R1:**	Uh huh

Line	Time	Name	Transcript
132.		**Milin:**	That's it, two, four, six *(Milin points to the towers of three as he counts)* and eight would be *(Milin starts to pull more cubes apart)*
133.	00:07:04	**R1:**	What about this one? *(R1 points to towers with all blacks. One of Milin's cubes flies over and knocks down one of the towers)* oops *(R1 picks up the tower that was knocked down)* this one turned into this one. *(R1 points to black/black tower of two and then to black/black/black tower of three)*
134.	00:07:15	**Milin:**	Uh huh, but, if you wanted eight. *(Milin starts to build another tower)*
135.		**R1:**	Now we're going to get eight.
136.	00:07:21	**Milin:**	Oops *(Milin picks up a black cube)* we want blue *(Milin puts down black cube and picks up a blue cube to finish building black/black/blue tower)*
137.		**R1:**	Yeah
138.		**Milin:**	See… that would go into this family *(Milin points to black/black/black tower)* because of this. *(Milin points to black/black tower of two)*
139.		**R1:**	Yeah uh huh
140.	00:07:29	**Milin:**	And two blues *(Milin builds blue/blue/black tower)* and if you wanted two of something on top, it will go with either this or this. *(Milin points to the two sets of towers on the right).* So, here *(Milin puts the blue/blue/black tower in place)*
141.		**R1:**	Okay and so then it would turn into
142.		**Milin:**	Two, four, six, eight *(Milin points to the four groups of towers as he counts)*
143.	00:07:45	**R1:**	Oh I see. *(R1 turns two of the towers of three so that they are next to each other perpendicular to the corresponding towers of two)* So now we have these eight that come from *(Milin turns the other two groups of towers of three).* Those four. *(Milin waves his hand over the towers of two)*
144.		**Milin:**	Uh huh

Line	Time	Name	Transcript
145.	00:07:56	**R1:**	That's really interesting. That was this one. *(R1 points to column on Milin's paper with 3 and 8)*
146.		**Milin:**	Uh huh
147.	00:08:04	**R1:**	What about this one? *(R1 points to column on Milin's paper with 4 and 16)*
148.	00:08:05	**Milin:**	Sixteen. You could put one more on top of that, but *(Milin points to towers on the table)* but *(Milin hits his head with his hand)*
149.		**R1:**	Would, well, would that work?
150.		**Milin:**	Uh huh *(Milin nods his head)* we tried it out here before
151.		**R1:**	And so you put one more on top of this. *(Milin starts to play with his mike) (R1 points to black/black/blue tower of three)* what would you put on top of … How would, how would that one work?
152.	00:08:20	**Milin:**	Uh, you put anything on top of that.
153.		**R1:**	Okay, you're saying then *(R1 builds a black/ blue /blue tower and gives it to Milin)*
154.		**Milin:**	You put either a black or a blue on it. *(R1 builds another black/blue/blue tower)*
155.	00:08:34	**R1:**	Uh huh, like show me. Just for that one. *(Milin takes a black cube from the bottom of the tower that R1 had just built and puts it on top of the other black/blue/blue tower)* okay?
156.		**Milin:**	See
157.		**R1:**	Yup
158.		**Milin:**	Just put something on top of it
159.	00:08:46	**R1:**	I've got it. And then you do another one that had a blue on top of, I don't, I don't understand. What would the other one look like? *(R1 points to the towers)*
160.	00:08:52	**Milin:**	It would be a, a black.

Line	Time	Name	Transcript
161.		R1:	You need this, this underneath it? *(R1 hands Milin a black cube)*
162.		Milin:	A blue, another blue, cause it's four. *(Milin builds a black/blue/blue tower)*
163.	00:09:05	R1:	Uh huh, okay and so that means. Then from here to here *(R1 picks up the two towers of four that Milin just built and turns them so that they are next to each other).*
164.		Milin:	And that would work with all these too. *(Milin points to row of towers of three)*
165.	00:09:11	R1:	Okay, so how many are there gonna be? *(R1 straightens up towers of three)*
166.		Milin:	Sixteen
167.	00:09:15	R1:	Okay, so there'd be sixteen of those *(R1 points to towers of four)*
168.		Milin:	Yeah. Two for this, two for this, two for this, two for this , two for this, two for this, two for this. *(Milin points to each of the towers of three)*
169.		R1:	Yeah
170.		Milin:	And once you get to sixteen *(Milin points to the column with 5 and 32 on his paper)* you get all of them and you get thirty two.
171.	00:09:30	R1:	Oh really
172.		Milin:	But, it doesn't work on six, towers of six. *(Milin pushes himself out of his chair)*
173.		R1:	Why?
174.	00:09:36	Milin:	Cause it's different
175.		R1:	Why is it different for towers of six?
176.	00:09:39	Milin:	Uh *(Milin shrugs)*
177.		R1:	Can you show me your towers of *(Milin starts to reach for*

Line	Time	Name	Transcript
			something. R1 pushes towers away a little bit) now I'm gonna keep these here). You're saying that this pattern breaks up after five. *(R1 points to Milin's paper, then draws a vertical line on Milin's paper to the right of the column with 5 and 32).*
178.		**Milin:**	Uh *(Milin nods his head)*
179.		**R1:**	Is that right?
180.	00:10:00	**Milin:**	See *(Milin takes his original paper)*. Cause I got fifty. I made staircases and I made all of that
181.		**R1:**	Okay can we look at those? I'm gonna… can I, can I keep these over here, so that when we come back to them we can do it? *(R1 stands up and pushes the blue and black towers to the other side of the table)* you have your bag full. Don't you? Do you have all your towers of six in that bag down there on the floor?
182.		**Milin:**	Uh huh
183.		**R1:**	Uh, can we look at them? Oh, here they are over here. *(R1 finds the bag on the other end of the table)* Okay *(Milin pushes away some of the blue and black towers)*
184.		**Milin:**	Not on the floor but
185.		**R1:**	Okay, okay these are the towers of six. These are also some of your things with three colors aren't they? *(R1 starts to take towers out of the bag)*
186.	00:10:25	**Milin:**	Uh huh *(Milin stands up)*
187.		**R1:**	Okay, what you said you-you decided to do a different kind of strategy with staircases and things like that for towers of six. *(R1 hands Milin some of the towers from the bag)*
188.	00:10:38	**Milin:**	No, I put the same strategy into it, but
189.		**R1:**	Uh huh *(R1 continues to hand Milin towers)*
190.		**Milin:**	But I just got up to fifty that time.
191.	00:10:47	**R1:**	You have them all in here? I don't think you do. *(R1 dumps everything out of the bag)* I don't think you have fifty in

			here. Do you?
192.		**Milin:**	Yeah, most of them at least.
193.		**R1:**	You have tons of them. Okay, talk to me about what you did.
194.		**Milin:**	See, once I made a staircase of it I knew there'd be another duplicate of all those, so, because you just change this to red and put this to yellow. *(Milin points to yellow cube then a red cube in the towers which are in front of him on the table)*
195.	00:11:09	**R1:**	What do you mean by a staircase?
196.		**Milin:**	Like all one yellow and all reds or some. *(Milin picks up towers that are on the table as he looks through them).* There's got to be something in there. *(Milin looks through the pile of the towers)* I made something like that one yellow and all the rest were reds. *(Milin finds a tower with one yellow and all the rest reds. R1 picks it up)* and then see *(Milin holds up a red/yellow/red/red/yellow tower)* this one of them with another staircase.
197.	00:11:30	**R1:**	Another kind of pattern or another kind of staircase pattern?
198.		**Milin:**	But, *(Milin shrugs)* I can't really find all of mine in here.
199.		**R1:**	Oh you can't, yeah, because they're all sort of in here. Okay, I don't understand why what you were doing there *(R1 points to blue and black towers)* wouldn't keep working
200.	00:11:47	**Milin:**	Because once you get to five it's an odd number or something, but it doesn't work. *(Milin has two of his red and yellow towers in his hand that he starts to play with)*
201.		**R1:**	You sure?
202.		**Milin:**	Uh
203.		**R1:**	It works. Maybe, I'm so confused, Milin that we have all of these. I want, can we pull all these things back here. *(R1 moves the blue and black towers back)* can you build it for me again so I can think about this. These were the ones *(R1 finds towers of ones)* and the ones were one of each. Is that right?

Line	Time	Name	Transcript
204.	00:12:24	**Milin:**	Uh huh *(Milin is playing with his red and yellow towers)*
205.		**R1:**	And then there were the twos and how did the twos work?
206.	00:12:29	**Milin:**	Put another one on top of them. *(R1 pulls towers of two from the pile)*
207.		**R1:**	Yeah there were two of them.
208.		**Milin:**	For each
209.		**R1:**	And where did this one go? *(R1 picks up the blue/blue tower of two)* which one, which family was it with?
210.		**Milin:**	Uh
211.		**R1:**	Did it go here or did it go here? *(R1 points to two towers of one)*
212.	00:12:40	**Milin:**	Here *(Milin points to where it goes)*
213.		**R1:**	Okay
214.		**Milin:**	Cause it has to go here because *(Milin points to towers)*
215.		**R1:**	Yeah and then what about this one. *(R1 picks up black/blue tower of two)* Where did it go? *(Milin points to where it goes)*
216.	00:12:47	**Milin:**	Cause the black is on the bottom.
217.		**R1:**	Yeah
218.		**Milin:**	See *(Milin picks up tower of one and points to towers of two with black on the bottom)*
219.		**R1:**	Yeah
220.		**Milin:**	Look at this family.
221.		**R1:**	Yeah
222.		**Milin:**	It has to have a black on the bottom
223.		**R1:**	That family has to have a black on the bottom?

Line	Time	Name	Transcript
224.	00:12:55	**Milin:**	And this family has to get a blue on the bottom. *(Milin picks up blue tower of one and points to towers of two with blue on the bottom)*
225.		**R1:**	Had to have a blue on the bottom. Okay, and so it works for that. *(R1 straightens up towers)* Okay, now
226.		**Milin:**	Up to five *(Milin nods his head and picks up one of his red and yellow towers of six)*
227.		**R1:**	Yeah and now, now for the three. Okay for going from two to three, *(R1 pushes red and yellow tower away)* how many families are we gonna have going from two up to three?
228.	00:13:13	**Milin:**	Um, eight, because, see, there's four, and two for each one. *(Milin points to towers of two)*
229.		**R1:**	Yeah, okay, where does this go? Yeah, where doe s this one go? That one goes to that family? Where does this one go? *(R1 picks up towers of three ad Milin points to where each should go)*
230.	00:13:20	**Milin:**	Right here.
231.		**R1:**	That's so it's this family? Okay and where did this one go? I really don't understand this strategy. Okay, what about this one? We had this one didn't we? What did, what, does he go there?
232.		**Milin:**	Uh, this one, yeah *(Milin points to tower in R1's hand)*
233.		**R1:**	Okay where does this one go?
234.	00:13:46	**Milin:**	This one here *(Milin places the tower)* see just put a black on top of it.
235.		**R1:**	Okay, now here's our two other towers of three *(R1 hands Milin the last two towers)*
236.		**Milin:**	This one goes here *(Milin places one of the towers)*
237.	00:13:54	**R1:**	Uh huh
238.		**Milin:**	This one goes… bah dah… here *(Milin places the last tower)*

Line	Time	Name	Transcript
239.	00:14:01	R1:	Okay so that's the *(R1 reaches across the table. Milin pushes her hands away and pushes the groups of two together)*
240.		Milin:	Twos
241.		R1:	Yeah
242.		Milin:	Twos
243.		R1:	Yeah
244.		Milin:	Twos
245.		R1:	Yeah
246.		Milin:	And twos
247.		R1:	Yeah, yeah, okay, so if we line them this way *(R1 turns the groups of towers of three so that they are next to each other)* now how many do we have?
248.	00:14:12	Milin:	Eight
249.		R1:	Okay
250.		Milin:	It won't work on six because
251.	00:14:18	R1:	I don't understand, we go from three to four. *(R1 puts down a tower of four).* Maybe we could take one little family. Here's a one *(R1 moves black tower of one)* and what did it go to? Two here? *(R1 moves towers of two with black bottoms)* is that right? And then went here. *(R1 moves towers of three with black bottoms).* Okay now here's the other family that had the blue bottom. Is that right? *(R1 moves towers with blue bottoms).*
252.		Milin:	Yeah
253.		R1:	Okay
254.		Milin:	Uh, you could go to fives. *(Milin puts his hand over towers with black bottoms)*
255.		R1:	Well, let's go to fours first.

Line	Time	Name	Transcript
256.		**Milin:**	Fours first
257.		**R1:**	Okay here's this one and here's the other one that goes with that. *(R1 puts two towers of four into pattern)*
258.	00:14:51	**Milin:**	Now these guys have to separate a little. *(Milin pulls the towers of three further apart)*
259.		**R1:**	Yeah they have to separate and so
260.	00:15:01	**Milin:**	So they have their own family *(Milin knocks over one of the towers of three, looks for where it went and puts it down on the side)*
261.		**R1:**	Yeah, so, they're, he, he, he belongs in here *(R1 moves the tower of three back to the right place)*. Okay, alright and so you have these two. *(R1 points to the two towers of four)*
262.		**Milin:**	Uh huh and then the other two
263.		**R1:**	And then you went to fives. What would the fives look like for that? *(R1 points to one of the towers of four)*
264.	00:15:14	**Milin:**	Tsk, one would have a black bottom
265.		**R1:**	Uh huh
266.		**Milin:**	And all the rest blues for this *(Milin points to the black/blue/blue/blue tower of four)*
267.	00:15:20	**R1:**	Oh like *(R1 builds a tower with black and four blues)*
268.		**Milin:**	And one
269.		**R1:**	Like this? That would be one that came from there? *(R1 puts the tower she just built by the tower of four)*
270.	00:15:28	**Milin:**	Uh huh
271.		**R1:**	Yeah
272.		**Milin:**	And then you could always have another black on top of that.
273.	00:15:33	**R1:**	What do you mean another *(Milin coughs)* another one that

			goes
274.		Milin:	Like this, but instead of that blue put a black on there. *(Milin points to the blue cube on top of the tower of five)*
275.		R1:	*(R1 starts to build tower)* How many? It, it, it, would be just like this *(R1 hands Milin a tower with black/blue/blue/blue)*
276.		Milin:	It would be exactly like this, but just put an ordinary black instead of an ordinary blue *(Milin adds a black cube to the top of the tower)*
277.	00:15:49	R1:	Okay
278.		Milin:	It'll go here. *(Milin puts the new tower next to the other tower of five)*
279.		R1:	And so that means it would go with that?
280.		Milin:	Uh huh
281.		R1:	Okay, and so there were four of these *(R1 points to towers of four)* and how many in the next line?
282.	00:16:00	Milin:	So far two.
283.		R1:	No, well
284.		Milin:	But there's going to be thirty-two
285.		R1:	No, uh, okay this was eight *(R1 points across the line of towers of three)* and the next line was sixteen *(R1 points across the line of towers of four)*
286.		Milin:	Uh huh
287.		R1:	And this line, this one had two. Is this gonna have two? *(R1 points to the next tower of four then the next tower of three)*
288.		Milin:	Uh huh
289.		R1:	And then this one's gonna have two *(R1 points to the next tower of four)*
290.		Milin:	Uh huh

Line	Time	Name	Transcript
291.	00:16:15	**R1:**	How many did you say were gonna be in this line going across? *(R1 Points across the line of towers of five)*
292.		**Milin:**	Thirty-two.
293.		**R1:**	You sure, why?
294.	00:16:21	**Milin:**	We did it in class. That's one thing. *(Milin is playing with his mike and someone comes over to fix the mike)*
295.		**R1:**	Oh, and you remember that, okay
296.		**Milin:**	Um, another thing is, um, because if you follow the pattern up to this *(Milin points to his paper)*
297.	00:16:33	**R1:**	Uh huh
298.		**Milin:**	It'll do the same thing, keep on doubling
299.		**R1:**	Okay now these are the fives. What about him. How could you make him into a tower of six? *(R1 points to a tower of five)*
300.	00:16:44	**Milin:**	Him, you just put another, either a black or a blue on. *(Milin puts his hand over the tower of five and then in the air)*
301.		**R1:**	Okay, here would be, wait you have one black. *(R1 points to tower of five and then starts to build another tower)*
302.		**Milin:**	Yeah and all the rest blues.
303.		**R1:**	Four blues and one more. Okay, what else could it have been?
304.		**Milin:**	Um all of these, but instead of this blue put a black on. *(Milin points to the blue on top of the tower of six. R1 starts to build the tower)*
305.		**R1:**	Yeah *(R1 points to the tower of six and counts)* one, two, three, how many blues does it need?
306.		**Milin:**	Four, one more. *(Milin points to the tower of six)*
307.	00:17:20	**R1:**	One more? *(R1 puts on another blue cube)*

Line	Time	Name	Transcript
308.		**Milin:**	Then a black
309.		**R1:**	And then a black one? *(R1 puts on a black cube)*
310.	00:17:25	**Milin:**	See it has to have this *(Milin picks up the tower of five)*
311.		**R1:**	Uh huh
312.		**Milin:**	On the bottom like this, see? *(Milin points to the bottom of the two towers of six)*
313.		**R1:**	Uh huh
314.	00:17:30	**Milin:**	And then you put either a black or a blue on. *(Milin points to the top of tower of six)*
315.		**R1:**	Yeah, okay, but you're saying you couldn't do that for all of them going from five to six. *(R1 straightens towers)*
316.		**Milin:**	Uh huh, because there's going to be less.
317.		**R1:**	Why?
318.	00:17:43	**Milin:**	Because some of the families can't actually afford them. *(both laugh)*
319.		**R1:**	Oh, I see and so you are saying there's gonna be less because you're out of unifix cubes?
320.		**Milin:**	No *(Milin shakes his head)*
321.		**R1:**	What if you had plenty of unifix cubes? You mean this one couldn't do it? *(R1 points to one of the families of five)*
322.	00:17:59	**Milin:**	This one see *(Milin points to the same family of five)* if you could do that, right
323.		**R1:**	Uh huh
324.		**Milin:**	You could only put a black or a blue on, but somewhere in there *(Milin plays with his mike Again)* there's going to be this place where this one can't afford it. *(Milin laughs)*
325.		**R1:**	Yeah

Line	Time	Name	Transcript
326.	00:18:14	**Milin:**	But
327.		**R1:**	So you're saying
328.		**Milin:**	And you can't get one more on top of it, so *(Milin points to towers)*
329.		**R1:**	Why?
330.		**Milin:**	Cause *(Milin shrugs his shoulders)* for certain reasons
331.		**R1:**	Yeah, you just don't think you could.
332.		**Milin:**	*(Milin shrugs his shoulders)* unless I'm wrong.
333.	00:18:29	**R1:**	I wonder. When you, when you were, when you were finding them and you were using other strategies you say you only found fifty.
334.		**Milin:**	Um *(Milin nods his head)*
335.		**R1:**	Does this strategy then just not work after a while? *(R1 points to the towers)*
336.	00:18:43	**Milin:**	Uh huh, after five, maybe cause *(Milin pulls on his paper which is on the table)* ten's an even number and you can divide by five or something like that.
337.		**R1:**	Yeah, yeah, okay so, but this one which is our tower of five *(R1 picks up tower of five)* turned into these two *(R1 points to the towers of six)*. This was a tower of five *(R1 picks up the other tower of five)*
338.		**Milin:**	Turned into these, this
339.		**R1:**	What would it turn into?
340.		**Milin:**	Um, black, three blues, a black and a blue, or two blacks instead of one more blue. *(Milin points at the tower of five)*
341.	00:19:10	**R1:**	Okay, a black and a blue? Is that right? *(R1 builds a tower of six)*
342.		**Milin:**	Or another black
343.		**R1:**	And a black and three blues

Line	Time	Name	Transcript
344.		**Milin:**	Another black
345.		**R1:**	And a black and what? *(R1 is building a tower)*
346.		**Milin:**	And uh, let's see *(Milin picks up the tower)*
347.	00:19:27	**R1:**	That's coming from this one *(R1 points to the tower of five)*
348.		**Milin:**	And another black
349.		**R1:**	And another black, okay. *(R1 puts another black on and places it in row)*
350.		**Milin:**	But just doesn't work on this one
351.	00:19:36	**R1:**	Oh it just doesn't, you're just convinced that it's not gonna work on this one… but what if I keep not. I just don't understand. This was such a good way to get up to the fives. What would we have, what would you have to convince me?
352.		**Milin:**	Uh, make them.
353.		**R1:**	What would we have to build? You know what a pain. *(Milin sighs)* Okay here's our family from one *(R1 points to black tower of one)* that went to two *(R1 points to towers of two)*
354.		**Milin:**	That went to four.
355.		**R1:**	That went to four *(R1 moves towers of three)*
356.	00:20:04	**Milin:**	Then went to (under his breath) fifty.
357.		**R1:**	Okay, if I build, *(R1 puts hands on hips).* I'll build if you tell me what to build. How does it go? From three to four? (R1 points to towers of three). What do we do? You build the family for the first one. I'm just so confused at these family thats not gonna have enough money *(R1 moves towers of three again)*
358.		**Milin:**	Just put a black, blue black and another any kind of cube.
359.		**R1:**	What do you think? You have to tell me exactly what to do. Black blue *(R1 builds tower)*

Line	Time	Name	Transcript
360.	00:20:31	**Milin:**	Black and blue *(Milin stretches)*
361.		**R1:**	Okay black/blue/black/blue okay *(R1 puts finished tower in place)*
362.		**Milin:**	Or a black/blue/black/black *(Milin stretches and yawns)*
363.		**R1:**	Okay, or black/blue/black/black , okay *(R1 build tower and puts it in place)*
364.	00:20:49	**Milin:**	And that's that family
365.		**R1:**	Now how many is that?
366.		**Milin:**	Four *(Milin puts his hand over a tower)*
367.		**R1:**	That's ones that go with this
368.		**Milin:**	Uh huh
369.		**R1:**	Okay *(Milin stretches)* now these four would turn into how many in the next family? *(R1 points across row of towers of five)*
370.	00:21:03	**Milin:**	Um, eight
371.		**R1:**	And those eight would turn to how many in this family? *(R1 points to the row of towers of six)*
372.		**Milin:**	Sixteen *(Milin laughs)*
373.		**R1:**	You think?
374.		**Milin:**	Um (Milin shrugs his shoulders)
375.		**R1:**	Can you think of any that wouldn't work from eight to sixteen?
376.	00:21:19	**Milin:**	Uh… not yet *(Milin scratches over his eye)*
377.		**R1:**	Not yet?
378.		**Milin:**	See
379.		**R1:**	And so these would all work. Wouldn't they *(R1 points to

			towers of three for which towers of four were built)
380.		**Milin:**	Uh huh
381.		**R1:**	What about this one? *(Milin is playing with his mike again).* Is it gonna come to the next family? *(R1 points to the next tower of three)* What would it become?
382.		**Milin:**	*(R1 starts to build another tower with black/ black/ blue/blue)* but on fours you have to add *(R1 pus tower she just built into place)* another two all plain
383.		**R1:**	Um
384.		**Milin:**	One color
385.		**R1:**	Um
386.		**Milin:**	And that would
387.		**R1:**	What do you mean? Show me on something
388.		**Milin:**	You see, on this one you just put another blue on *(Milin points to the tower of three blues)* and on this one you just put another black on *(Milin picks up the tower of three blacks)*
389.	00:21:55	**R1:**	Yeah, what else could you do to this one? *(R1 points to the tower with three blacks)*
390.		**Milin:**	See
391.		**R1:**	Okay, here this this family, right here I'm concerned about. *(R1 pick up tower of three with black/black/blue)* He went to him, and what else did you say he should do?
392.		**Milin:**	Put a black instead of this blue. *(Milin points to black/ black/ blue/blue tower of four)*
393.	00:22:06	**R1:**	Okay
394.		**Milin:**	Oh man *(Milin makes a face)*
395.		**R1:**	So it would be two blacks *(R1 starts to build another tower)* a blue *(Milin sighs)* from here to here. *(R1 points to tower of three changing to tower of four)* this is really interesting.

Line	Time	Name	Transcript
			You said it was gonna go from eight *(R1 points to row of towers of three)* to sixteen. *(R1 points to row of towers of four)*
396.	00:22:23	**Milin:**	*(Picks up red and yellow tower of six).* Sixteen
397.		**R1:**	With their family
398.		**Milin:**	To thirty-two
399.		**Milin:**	From thirty-two to fifty *(Milin laughs)*
400.		**R1:**	Because it somehow breaks down?
401.		**Milin:**	*(Milin nods his head)* yes, do you give anybody else this problem?
402.		**R1:**	You know there are some other people who've been thinking about this problem a lot. Stephanie, do you know you know the reason that you that you didn't come in all morning? *(Milin is playing with the red and yellow tower)*
403.	00:22:47	**Milin:**	Yeah, Stephanie
404.		**R1:**	Wonder what she was doing
405.		**Milin:**	Uh huh *(Milin nods his head)* same as me
406.		**R1:**	She was working this problem the same, nobody, no two people ever do it the same way exactly, but people do have some of the same ideas.
407.	00:23:04	**Milin:**	How many did she get?
408.		**R1:**	I am not going to tell you. You're gonna have to ask her. You're gonna have to go back. Uh, she was working, uh, Dr. Maher, she was working for towers of four to begin with.
409.		**R2:**	Today
410.		**R1:**	Today, yeah *(R1 nods her head)*
411.	00:23:25	**R2:**	She worked
412.		**R1:**	Yeah

Line	Time	Name	Transcript
413.		R2:	With the towers of six the last time, and then she went to four, and then she did some work with five
414.		R1:	Uh huh
415.	00:23:33	R2:	This time, but I think also Michelle was working on this and Jeff
416.		R1:	Uh huh
417.		R2:	And I think it would be a good idea if you talked to each other. Do you ever talk to each other about these problems?
418.	00:23:46	Milin:	Uh uh *(Milin shakes his head no and laughs)*
419.		R2:	I think that, I think Stephanie might really want to tell you what she is doing. *(R1 keeps on saying yeah while Dr. Maher is talking)* She's ready to talk about it.
420.		R1:	Okay, what, what Milin is saying is that when he built up his towers, he came up with this strategy for these smaller ones
421.		Milin:	Uh huh
422.	00:24:02	R1:	Can you, can you explain, because Dr. Maher wasn't here when you first came in.
423.		R2:	You know what, Mrs. O'Brien has an idea
424.		R1:	Uh huh
425.		R2:	I think it's a good one we ought to consider.
426.	00:24:10	R1:	Uh huh
427.		R2:	I think we ought to come back and bring them all together
428.		R3:	Just let them share
429.		R1:	And share, but, but, but this doesn't mean that they can't talk before *(R1 points to Milin)*
430.		R2:	If they want to, but it would be sort of nice though, even if they don't have time., because it doesn't happen *(R1 saying*

Line	Time	Name	Transcript
			yeah as Dr. Maher talks)
431.		R1:	Yeah
432.	00:24:25	R2:	If we could bring them together to talk about the different ways they're thinking about it because you said something that's very important that everyone's ideas are a little bit different. *(Milin has been playing with his red and yellow towers up to this point during the exchange. At this point he knocks down some of the black and blue towers, puts them back and leans on his elbow)* and I don't know. I wish 1 saw what you did Milin, but if you could even write about your ideas so that, um, I could read the way you're doing it, and your thinking. Do you think you could write about it.
433.		Milin:	Um *(Milin nods his head)*
434.		R2:	That would help me a lot
435.		R1:	It really would help me a lot, especially your you're your sort of ideas about how it works a certain way *(R1 points to Milin's paper)*
436.	00:24:55	Milin:	But this
437.		R1:	Up to here
438.		Milin:	This might not do it, but it might. *(Milin points to his paper)*
439.		R1:	It might.
440.	00:25:03	Milin:	I might be wrong or something
441.		R1:	Yeah, and you might need to be thinking a little bit about it *(Milin picks up some blue cubes, then one of his red and yellow towers)*. In terms of seeing whether what your, what your, what your strategy is up to here is gonna keep going on or not. Before we leave, because I do want you to go back, maybe and talk to them, is our other problem was the *(R1 picks up Milin's original paper)*. Uh *(R1 looks towards R2)*. Milin made up his own problem last time.
442.		R2:	Oh
443.		R1:	He was very concerned as to what would happen if you had

Line	Time	Name	Transcript
			three colors, and he was interested to think about *(R1 turns to Milin)* what they were three high.
444.	00:25:35	**Milin:**	Yeah
445.		**R1:**	And uh, but even if they were one high and you had three colors how many would there be?
446.		**Milin:**	Three
447.		**R1:**	Yeah, can, I remember we did that last time. *(R1 looks at paper)* didn't we?
448.		**Milin:**	Uh huh
449.		**R1:**	Uh, maybe we could write that down here *(R1 points to paper in front of Milin)* because I want to keep these here. *(R1 hands Milin the pen).* If there were, if there were towers of one high *(Milin starts to write on the right side of the paper)* let's say this is two colors. You have that up here *(R1 points to paper)*
450.	00:25:57	**Milin:**	Up to here *(Milin points to paper)* is two colors, but
451.		**R1:**	Okay
452.		**Milin:**	I'll just draw this line *(Milin draws a horizontal line)*
453.		**R1:**	Yeah, okay
454.	00:26:04	**Milin:**	And make it for
455.		**R1:**	Three colors
456.		**Milin:**	Three colors *(Milin writes three colors)*
457.		**R1:**	Okay, now underneath it *(R1 points to paper)* maybe we could keep it in the same rows. If there was, if there were towers that were one high
458.	00:26:14	**Milin:**	One? *(Milin writes a 1 with a line underneath in the center of the paper)*
459.		**R1:**	Let's put that over here. Over here *(R1 points o paper).* You see where it says one?

Line	Time	Name	Transcript
460.		**Milin:**	For this one?
461.		**R1:**	Uh huh
462.		**Milin:**	Cause its gonna be eight in three colors, so
463.		**R1:**	Yeah I know it, but still if there if there if the if the towers only have one block in them how many would there be? *(R1 takes the pen from Milin and writes one on the paper then gives the pen back)*
464.	00:26:29	**Milin:**	Three
465.		**R1:**	Okay that and put the three underneath *(R1 points to where she wants Milin to write the three)*
466.		**Milin:**	I'll put a three here. *(Milin writes underneath where he had written 1)*
467.		**R1:**	Okay, that's fine, alright. Okay, can you tell me what they'd be with your colors? It would have been a uh, a white and *(R1 takes white cube)*
468.	00:26:42	**Milin:**	Just take one of each cube *(Milin reaches for cubes)*
469.		**R1:**	A white and a yellow
470.		**Milin:**	White, yellow *(Milin pulls the cubes apart with his teeth)*
471.		**R2:**	How many, how many did Milin think? I'm curious.
472.		**R1:**	He said it'd be three if they were one high.
473.		**R2:**	No, three high, what did he think
474.		**R1:**	Uh, for three high? What did you think Milin?
475.	00:26:56	**Milin:**	Seventeen or fifteen
476.		**R1:**	Wasn't it, where'd you have it written down? *(R1 looks through papers that were on the table)*
477.		**R2:**	Seventeen or fifteen?
478.		**R1:**	I just saw it. I just lost your paper. *(Milin looks on the floor)*

Line	Time	Name	Transcript
479.		**R2:**	On the back
480.		**Milin:**	No its
481.		**R1:**	Oh no, its this. *(R1 picks up one of the papers from the table).* What did you say, at home *(R1 points to the paper)*
482.		**Milin:**	I *(Milin picks up another paper from the table).* That's the real answer, but *(Milin points to the paper in R1's hand)*
483.		**R1:**	Oh that's the real answer, uh *(R1 puts her paper down)*
484.	00:27:15	**Milin:**	But this I thought was either fifteen or seventeen, but *(Milin shrugs).* It came to be twenty five. *(Milin shows R1 the paper in his hand)*
485.		**R1:**	Oh, came to be twenty-five.
486.		**R2:**	What did you do when you were at home?
487.	00:27:26	**R1:**	Okay, we're gonna move these, cause we're done with them for right now. *(Milin stretches and yawns. R1 pushes blue and black towers away).* Okay there were these three. How many if they were two high?
488.		**Milin:**	Two high would be six.
489.		**R1:**	Why?
490.		**Milin:**	One thing is, put a yellow, a yellow and anther yellow. *(Milin puts a yellow on each tower of one. The bell rings)*
491.	00:27:50	**Milin:**	I have to get back to class.
492.		**R1:**	And then what do you need to begin with?
493.		**Milin:**	Then—a white *(puts a white cube on top of a while cube)...*
494.		**R1:**	Yeah.
495.		**Milin:**	...a red and a white *(puts a white cube on top of a red cube)...*
496.		**R1:**	Mmhmm..

Line	Time	Name	Transcript
497.	00:28:07	**Milin:**	(*suddenly)* There would be 9.
498.		**R1:**	Why?
499.		**Milin:**	Red and a white, and then there...We did this in here before...
500.		**R1:**	Yeah, I'm just trying to remember—
501.		**Milin:**	...and...
502.		**R1:**	Because it's been so long—and then a yellow and a white *(puts a white cube on top of a yellow cube, and gives them to Milin).*
503.		**Milin:**	...this...*(lines up the three towers of 2s with white on top)*
504.	00:28:25	**R1:**	And then...
505.		**Milin:**	A red (grabs a red cube), a red and a red *(puts the red cube on another red cube).*
506.		**R1:**	Mmhmm…
507.		**Milin:**	A red and a—a yellow and red *(puts a red cube on top of a yellow cube).*
508.		**R1:**	No, the red is on the bottom. Yeah, yeah, yeah.
509.	00:28:42	**Milin:**	And a white and a red.
510.		**R1:**	No. Oh, okay. Yeah, you're absolutely right. I'm absolutely wrong. Okay. Uh, okay.
511.		**Milin:**	*(puts a red cube on top of a white cube. lines up the three towers of 2s with red on top)* It can't be 6 because—
512.		**R1:**	Why can't it be 6?
513.		**Milin:**	'Cause there's 3 colors.
514.		**R1:**	Mmhmm...
515.		**Milin:**	You have to do something different.
516.		**R1:**	Mmhmm...

Line	Time	Name	Transcript
517.	00:28:59	**Milin:**	It was 6, that would be only for—uh—2 colors, I think. No, 2 colors was 4.
518.		**R1:**	Mmhmm...
519.		**Milin:**	For some reasons...
520.		**R1:**	Yeah
521.		**Milin:**	...this is turning out bad.
522.		**R1:**	Yeah. Okay, so for 3 colors it was..-it was..-towers of 2 was..-was what?
523.	00:29:20	**Milin:**	Towers of 2s were...I'll just turn this into a 2 *(overwrites I on sheet with a 2. And then writes 9 under the 2).*
524.		**R1:**	Okay, and so, here they are *(lines up the 9 towers of 2s with red, white, and yellow cubes in front of Milin).*
525.		**Milin:**	Towers of 1 is 3. Towers of 3 is 25 *(writes 25 under 3 on sheet)...*
526.		**R1:**	Wait, wait, wait.
527.		**Milin:**	.for some unknown reason.
528.	00:29:42	**R1:**	Why?
529.		**Milin:**	Um. One thing is, if you...do this kind of a strategy, *(school bell rings)* you would get 25.
530.		**R1:**	Would you? Why? Explain to me how you would do...
531.		**Milin:**	See, this one would have another 3 *(holds tower wish red cube on lop of yellow cube)* probably.
532.		**R1:**	Mmhmm...So there'd be 3 for this one.
533.		**Milin:**	Another 3 *(holds tower with red cube on top of another red cube)...* another 3 *(holds tower with red cube on lop of white cube)...*that would be 9 times..3 ...26?
534.	00:30:11	**R1:**	*(offers pen. Milin smiles)* What is 9x3?

Line	Time	Name	Transcript
535.		**Milin:**	*(Does not use pen)* 9...I mean 27, hehe, but that's not going to work out on this one.
536.		**R1:**	You don't think?
537.		**Milin:**	It's not going to be in this kind of a pattern *(points to list located at top of sheet containing the number of towers with 2 colors for different heights).*
538.		**R1:**	You don't think? Why not?
539.		**Milin:**	One thing is it can't be by this *(points to list again)* because this one was timesed by 2, but now there's something else. So, it's different.
540.	00:30:35	**R1:**	And so it's different. It worked from 1 to 2.
541.		**Milin:**	Mmhmm.
542.		**R1:**	Yeah.
543.		**Milin:**	But 2 to 3 *(shakes head no)*...
544.		**R1:**	You don't think there'd be 3 *(points to tower with red cube on top of yellow cube)* to go with that one?
545.		**Milin:**	Uh, you put that…another one *(whispered)*… put that there *(whispered)*… white
546.	00:30:54	**R1:**	Okay, so what would be yellow? Uh, what did you just think? Yellow, red, and...White, (*builds tower with yellow, red. white, from bottom to top)* Okay, what else could it be? *(builds lower with red cube on top of yellow cube)*
547.		**Milin:**	Another red on top of that *(points to the lower with red cube on top of yellow cube).*
548.		**R1:**	A yellow, red, and...
549.	00:31:10	**Milin:**	Red.
550.		**R1:**	...red *(puts red cube on top of the tower).* Anything else?
551.		**Milin:**	Yellow, red, and yellow...But someplace it breaks up like 32, hehe...

Line	Time	Name	Transcript
552.	00:31:23	**R1:**	*(builds tower with yellow, red, yellow, from bottom to top)* Just...you think, you still think it's going to break up between the 2 and the 3...
553.		**Milin:**	Mmm.
554.		**R1:**	...to just give you 25?
555.		**Milin:**	Mmm.
556.		**R1:**	"Cause that's what you got. Yeah.
557.		**Milin:**	Mmm.
558.		**R1:**	Yeah, yeah. It's these break up things that I'm really concerned about, and that sometimes it seems to you to work and sometimes not. So there's just 3 for...
559.	00:31:37	**Milin:**	It just breaks up somewhere.
560.		**R1:**	...this one *(points to lower with red cube on top of yellow cube)*. This one? *(points [o tower with red cube on lop of another red cube)* Would there be 3 for that one?
561.	00:31:57	**Milin:**	Uh...umm...maybe.
562.		**R1:**	What do you think they'd be?
563.		**Milin:**	Put another red on top of this *(holds onto tower with red cube on top of another red cube)*.
564.		**R1:**	Uh-huh.
565.		**Milin:**	Urn, put a white on top of it, put a yellow on top of it *(puts back down tower with red cube on top of another red cube)*.
566.		**R1:**	Uh-huh, uh-huh, uh-huh.-.yeah, yeah, yeah...
567.		**Milin:**	But someplace it's got to break up.
568.	00:32:20	**R1:**	Why?
569.		**Milin:**	For some mysterious reason *(laughs)*.
570.		**R1:**	Some mysterious reason! You know, Milin, you've done a wonderful job talking about these things. And, we've moved

Line	Time	Name	Transcript
			sort of from here to the next one. These...this family strategy I think is a really kind of good one. You had some other strategies?
571.		**Milin:**	Uh huh, like staircases.
572.		**R1:**	Yeah. Anything that you can remember?
573.	00:32:46	**Milin:**	'Cause I found this out like about today when I was reading this paper, so I just went along with it.
574.		**R1:**	What, the family strategy?
575.		**Milin:**	Yeah, hehe
576.		**R1:**	So, that's a pretty new strategy. So, it probably needs some thinking about and testing and talking to your friends. Okay, uh, would you do that?
577.		**Milin:**	Mmhmm *(quietly)*.
578.	00:33:06	**R1:**	Go back and try to see if you can figure out where it breaks down, or if it breaks down, or if there's some that you missed in your staircases.
579.		**Milin:**	Yeah.
580.		**R1:**	Is that one of those kinds of things?
581.		**Milin:**	Building staircases are a wrong thing to do.
582.		**R1:**	Ah...Well, they helped you a lot. You found an awful lot.
583.	00:33:25	**R2:**	*(off-camera)* Well, I want to know why do you think...?
584.		**Milin:**	Because, uh, maybe staircases don't have a couple of things.
585.		**R2:**	*(off-camera)* Like what?
586.		**Milin:**	Like...if you have this *(grabs tower with red cube on top of yellow cube)* and this *(puts tower on top of tower with red, yellow, from top to bottom)*, see *(holds up newly-built tower)*, it won't be a staircase...at least not a nice one.
587.	00:33:44	**R2:**	*(off-camera)* I see.

588.		R1:	Yeah, he came in with some really interesting ones. Yeah.
589.		Milin:	Mmhmm.
590.		R1:	Would that be interesting if we got sort of a group of you that have all been thinking about it together?
591.		R2:	Good idea you came up with, Milin, that I think, you know, you know, if Mrs. Barnes wouldn't mind during math if you all came and talked and maybe shared with the rest of class.
592.	00:34:09	Milin:	Okay *(quietly)*.
593.		R1:	Okay. Now what I'd like you to do because then this is...Stephanie may be thinking about some of the same things too...is to think about this, build them if you need to, but write me, or write for yourself. Do, do you keep a journal? I mean, do you do a math journal or any of those kinds of things, Milin?
594.		Milin:	Uh just a daily journal in reading class.
595.		R1:	Yeah. Okay, but maybe you just need some writing like you've been doing here *(holds up sheet)*. You've done a really, a really, a good job of keeping some of these records. I'm going to....
596.		Milin:	But, I think I did something wrong on umm. from 32 to go to 6. I think I did something wrong.
597.	00:34:58	R1:	Why?
598.		Milin:	Mmm, I don't think that pattern would break down like..
599.		R1:	You really don't? You...
600.		R2:	*(off-camera)* Ah-ha
601.		R1:	If it didn't break how many should there be?
602.		Milin:	Uh, 64
603.		R2:	*(off- camera)* "Well I, you know I think you're ready to talk to Stephanie.
604.	00:35:16	R1:	Yeah, I think so too.

Line	Time	Name	Transcript
605.		**R2:**	*(off-camera)* And tell her what the problem is, so maybe the two of you can come up with something to share with us next time, Milin.
606.		**Milin:**	Mmhmm.
607.		**R2:**	*(off-camera)* Okay?
608.		**R1:**	The other thing is that I'd like you to share with Stephanie is—Stephanie hasn't been working on this problem
609.		**R2:**	*(off-camera)* Yeah, I'd like her to work on it.
610.		**R1:**	This is a new one. And if we're going to come back and talk together, it's only fair that she's had a chance to try some of these too. Is that right?
611.		**Milin:**	Mmhmm
612.		**R1:**	And so your questions—You were interested in checking out with the towers of six?
613.	00:35:50	**Milin:**	My guesses are 50, if I was right the first time, or 64.
614.		**R1:**	50 or 64 *(writes on sheet)...Now* with the towers of three with three colors, you said your guess *(circles answer written for towers of 3s with 3 colors on list)* was 25, if you were right the first time. But if the family thing works?
615.	00:36:13	**Milin:**	It's probably not going to work with this *(points to towers with 3 colors),* but it's going to work with this *(points to lowers with 2 colors)* I'm pretty sure of that.
616.		**R1:**	Yeah, yeah, yeah, yeah, yeah. But you were saying that this *(points to the lowers of 2s with 3 colors)* turned out to be nine.
617.		**Milin:**	Mmhmm—-somehow *(laughs).*
618.		**R1:**	Well, because you put a—because you did it like a family. Isn't that right? Is that right?
619.		**Milin:**	Uh-uh *(disagrees).*
620.	00:36:34	**R1:**	Oh! It's different for the family. Your families had hats

Line	Time	Name	Transcript
			instead of bottoms for this one, don't they? Yeah. So it's slightly...
621.		Milin:	Yeah, but they can have other kinds of hats too.
622.		R1:	Could they?
623.		Milin:	So...
624.		R1:	Yeah, yeah- Okay, and so this came from 3 *(points to the lowers of 2s with 3colors),* and it turned into 9.
625.		Milin:	And nine came from that. And for nine, who knows?
626.		R1:	Well, yeah. You were saying though that, uh, that one of them turned out to have...three hats. It was this one here *(pulls out tower with red cube on top of yellow cube).* And it came over, and it had a yellow hat *(holds onto tower with yellow/ red/ white, from bottom to top),* and it had a red hat *(holds onto tower with yellow. red. red, from bottom to top).* Could it have had another one?
627.		Milin:	White.
628.		R1:	Really, what would it have looked like?
629.		Milin:	A red, yellow, and a white on top of it.
630.		R1:	Or a yellow, red, and a white. Is that right?
631.		Milin:	Yeah.
632.		R1:	And which would it have been? A yellow, a red...
633.		Milin:	And then another white.
634.	00:38:24	R1:	...and then a white *(builds lower with yellow, red. white, from bottom to top).* So it came...it, it ended up with 3. Yeah.
635.		Milin:	See, but that's only if you have a bottom, but you might have more or less.
636.		R1:	Yeah, you might. So, we're leaving you with a real question there. Do you think you and Stephanie can work on that one some together?

Line	Time	Name	Transcript
637.		**Milin:**	Mmhmm.
638.		**R1:**	Okay, what do you need to take with you?
639.		**Milin:**	Umm.
640.		**R1:**	Anything?
641.		**Milin:**	Not really.
642.		**R1:**	You have Unifix cubes in your room, in case you need 'em to prove to each other things?
643.		**Milin:**	No.
644.		**R2:**	*(off-camera)* Let him take them.
645.		**R1:**	Let's, shall we, let me, let's pack up your, uh, your 3 colors because if you're going to be talking to Stephanie, you're going to have to show her what you're talking about. Okay? *(starts packing Unifix cubes into bag)*
646.		**Milin:**	Mmhmm.
647.		**R1:**	Okay, and, umm...
648.		**Milin:**	Then I'm going to need the 6 color ones, of course.
649.		**R1:**	Well, everything you brought. Can you just do with these yellows, and reds, and whites? Is that right?
650.		**Milin:**	Mmhmm.
651.		**R1:**	Okay, uh, and is this the paper you need to take? *(holds up sheet)*
652.		**Milin:**	Uh, yeah. That's the question one.
653.		**R1:**	Yeah, uh, it's towers of six with two colors, and towers of three with...
654.	00:39:35	**Milin:**	With a question.
655.		**R1:**	...with three colors. Okay? Milin, I thank you so much for coming back today,

			and cutting your lunch so early. That was really...
656.		Milin:	Well, we were going to go out in a minute or two probably, *so...(puts sheet into bag)*
657.		R1:	Yeah, yeah. You're going to put that down in there?
658.		Milin:	It's not like I missed my lunch.
659.		R1:	You got it! Yeah. Okay, what can we do here? *{continues packing bag)*
660.		Milin:	I put tape on it.
661.		R1:	Mmhmm.
662.		Milin:	That's the only thing I could think of.
663.		R1:	Sure. Yeah, because it was just so full. Yeah. Okay, now, I'm going...Do you mind if I just keep this one? *(holds up sheet)* This was your answer from last time. Okay, let me give it to Amy 'cause she keeps all my papers so that I don't lose 'em. I'm, I'm not near as good as you is at keeping all this stuff, together. Okay?
664.		Milin:	*(bag bulges open)* Oh, no.
665.		R1:	You may have to ask...Oh, look. Do you know what we have?
666.		R3:	*(walks up to table with tape, Milin laughs)* Super tape. Let's try this.
667.		R1:	Milin will never get back in.
668.		R3:	Now, let's see. Do we need a scissor to cut this?
669.		R2	*(off-camera)* No. It's tear-through.
670.		R3:	Oh...thank you. I love the way she does that. And I think if we do it maybe this way it would be better?
671.		R1:	Yeah, don't you think?
672.		R3:	I think so. Let's make it nice and tight *(puts tape on bag)*...

Line	Time	Name	Transcript
			tight. That ought to hold.
673.		**R1:**	Here's you package.
674.		**R3:**	Oh, you're stuck with that [the microphone] again, huh?
675.		**R1:**	Uh, me too. Okay, thank you so much, hon'. You have a good weekend.
676.		**R3:**	Take care, Milin.
677.		**Milin:**	You too.