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MULTIMODAL RESOURCES IN STUDENTS' EXPLANATIONS IN CLIL INTERACTION[1,2]

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Abstract: In recent years, Content and Language Integrated Learning (CLIL) has received much attention in linguistics and pedagogy. Based on a single case analysis, it will be shown how a detailed sequential analysis of video-recordings of naturally occurring classroom interaction enables us to understand how an explanation can be accomplished collaboratively by participants in a specific language-learning environment like CLIL. Drawing upon Conversation Analysis (CA), Interactional Linguistics (IL), and Multimodal Analysis, the questions addressed are a) what verbal, para-verbal, and non-verbal resources can be used by students to carry out the interactional activity of 'explaining'? and b) how is the activity sequentially organized and collaboratively achieved by all participants? It will be shown that a sequential, multimodal approach is useful in revealing the subtle resources students deploy to construct meaning, in collaboration with the teacher and fellow students, in the course of an 'explaining'. It is the cooperation between all participants which helps students accomplish the activity, where language and content problems are displayed through pauses, facial expression, pointing, and gesture, and resolved by fellow students through prompts and additional comments. Taking such findings into account, CLIL teachers should be encouraged to create opportunities for students to make use of various semiotic resources, allowing for the explainer and for the class to collaboratively negotiate subject-related content as well as linguistic form.

Keywords: Conversation Analysis, Interactional Linguistics, Multimodality, explanation, Content and Language Integrated Learning (CLIL)

Özet: İçerik ve Dil Entegreli Öğrenme (İDEÖ) son yıllarda dilbilim ve eğitim alanlarında oldukça önem kazanmıştır. Bu çalışmada, bir durum çözümlemesini baz alarak, İDEÖ gibi özel bir dil öğrenim ortamında doğal sınıf etkileşimini içeren video kayıtlarının ayrıntılı ardışık çözümlemesinin katılımcıların işbirlikçi açıklamalarını anlamamıza nasıl yardımcı olduğunu göstereceğiz. Konuşma Çözümlemesi (KÇ), Etkileşimsel Dilbilim (ED) ve Çok Kipli Çözümleme (ÇKÇ) yöntemlerini kullanarak, şu sorulara odaklanılmıştır: a) Açıklama eyleminde, öğrenciler tarafından hangi sözsel, söz-ötesi, ve sözsüz kaynaklar kullanılmaktadır? Ve b) Aktivite katılımcılar tarafından nasıl ardışık bir şekilde organize edilmekte ve nasıl işbirlikçi bir şekilde tamamlanmaktadır? Bulgular göstermektedir ki ardaşık, çok kipli bir yaklaşım, öğrencilerin (diğer öğrenciler ve öğretmen ile birlikte) açıklama eylemleri esnasında ne gibi kaynaklar kullandıklarını açığa çıkarmak için çok faydalıdır. Aktivitenin başarılı bir şekilde tamamlanmasını sağlayan bireyler arasındaki işbirliğidir; ve bu esnada dil ve içerik ile ilgili problemler; duraksamalar, yüz ifadeleri, işaret etme, ve mimikler ile gösterilmekte, ayrıca diğer öğrenciler tarafından istem ve ek yorumlar vasıtası ile çözülmektedir. Bu bulguların ışığında iddia edebiliriz ki, İDEÖ öğretmenleri, çeşitli göstergebilimsel kaynakları kullanmalarına fırsat yaratmaları için öğrencileri teşvik etmelidir, ve böylece hem açıklamaları yapan kişinin hem de tüm sınıfın hem içerik bazlı hem de dilbilgisel yapıları işbirlikçi bir şekilde tartışabilmeleri sağlanmış olacaktır.

Anahtar sözcükler: Konuşma Çözümlemesi, Etkileşimsel Dilbilim, Çok Kiplilik, açıklama, İçerik ve Dil Entegreli Öğrenme (İDEÖ)

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1. Introduction

Content and Language Integrated Learning (CLIL) "involves learning subjects such as history, geography or others, through an additional language. It can be very successful in enhancing the learning of languages and other subjects, and developing in the youngsters a positive 'can do' attitude towards themselves as language learners" (Marsh, 2000, p. 2).

In recent years, CLIL has received much attention in linguistics (Dalton-Puffer, 2007; Nikula, 2007) and pedagogy (Kupetz and Ziegenmeyer, 2005, 2006; Lyster, 2007; Zydatiß, 2007). Dalton-Puffer (2007) provides an extensive account of CLIL interaction, and also deals with explanations in CLIL interaction. However, her study is based on audio-recordings, and she therefore does not account for multimodal aspects of explanations. Communicative practices which are constitutive for explanations in talk-in-interaction have been studied quite extensively from a conversation-analytic perspective (see the edited volume by Spreckels, 2009), especially in classroom interaction. Yet, very often, the main focus was on teachers' explanations (Appel, 2009; Seedhouse, 2009; Koole, 2009, 2010). Studies focusing on students' explanations were based on learning environments in the first language and either revealed syntactic patterns of students' explanations (Neumeister, 2009), or analyzed the role of teachers' feedback (Harren, 2009).

Against the background of these studies, the following questions will be addressed in this paper: In the CLIL classroom, what multimodal resources can be used by students to carry out the interactional activity of 'explaining'? How is this activity sequentially organized and collaboratively achieved by pupils interacting with each other and with their teacher? The overall aim of this paper is to show that a conversation-analytic and interactional-linguistic perspective, focusing on the multimodal resources deployed, can provide insights into a specific language-learning environment like CLIL interaction.

2. Conversation Analysis, Interactional Linguistics, and Multimodality

The present analysis draws upon Conversation Analysis (Sacks, 1992; Hutchby and Wooffitt, 1998; Sidnell, 2010) and Interactional Linguistics (Selting and Couper-Kuhlen, 2000; Barth-Weingarten, 2008):

> [A]n interactional linguist asks two sorts of questions which implicate language: (i) what linguistic resources are used to articulate particular conversational structures and fulfil interactional functions? and (ii) what interactional function or conversational structure is furthered by particular linguistic forms and ways of using them? (Couper-Kuhlen and Selting, 2001, p. 3)

Thus, the overall aim is to reveal the linguistic resources which are used by a student to accomplish the specific interactive activity of 'explaining', or vice-versa, at revealing how an 'explaining' is actually achieved by the deployment of specific meaning making resources in the activities' overall sequential structure. It will be shown that next to verbal and para-verbal resources, nonverbal resources need to be analyzed in order to account for the full cluster of resources that can be involved in social activities (Selting, forthcoming), as "different modalities work together not only to elaborate the semantic content of talk but also to constitute coherent courses of action" (Stivers and Sidnell, 2005, p. 1). Therefore, notions from the fields of research called 'Multimodal Analysis' and 'Coordination' (Norris, 2004; Stivers and Sidnell, 2005; Mondada, 2006, 2007; Deppermann and Schmitt, 2007) will be relied on, too. The term 'multimodality' refers to the coordinated deployment of non-verbal resources such as gesture, facial expression, gaze, body display, as well as verbal and para-

verbal resources such as (morpho-)syntax, lexico-semantics, phonetics, and prosody[3]. Stivers and Sidnell (2005) follow Enfield (2005) and refer to these resources as channels of either the 'vocal/aural' or the 'visuospatial' modality (pp. 2). According to Norris (2004, p. 3), 'communicative modes' can be distinguished with regard to their materiality. Spoken language, e.g., is neither visible nor enduring, but of audible materiality; gesture is also fleeting, but of visible materiality. Objects, by contrast, are of visible materiality and extensively enduring. All bodily and non-bodily resources relevant for the social activity will be paid attention to in this paper, and it will be described how the manipulation of objects can serve as a meaning-making resource in the activity of 'explaining', as "[meaning] is not just 'contextualized' by the material environment; rather, the environment, through the interpretive use the participants make of it in their situated activities, becomes a component of the process of communication" (Streeck, 1996, p. 366). As the coordination of resources takes place in time – with regard to the sequential organization of turns – but also in space – with regard to the connection of characteristics of space and arrangements of bodies (Mondada, 2007), it is considered intrapersonally as well as interpersonally (Deppermann and Schmitt, 2007).

With regard to the application of a conversation-analytic approach towards the analysis of multimodal interaction, Stukenbrock (2009a, p. 163) points out: In order to account for the interactivity and multimodality in the process of an explanation, the conversation-analytic concept of the 'next turn proof procedure' needs to be broadened. This methodological validation tool, ensuring "that analyses explicate the orderly properties of talk as oriented-to accomplishments of participants, rather than being based merely on the assumptions of the analyst" (Hutchby and Wooffitt, 1998, p. 15), should not be restricted to verbal resources used in social interaction. Rather, participants' visual displays and the manipulation of objects are to be looked at closely and considered for sequential analyses, too.

3. Explanations in CLIL interaction

In the last decade, researchers of varying methodological backgrounds have studied explanations in CLIL interaction. Mohan and Becket (2001) use a Systemic Functional approach to analyze recast sequences in causal explanations in a content-based ESL course at University level. They show how scaffolding interaction between teachers and students help students to develop L2 resources, which enable them to construct meaning in discourse (pp. 151). Lazaraton (2004) explores the gestures used by ESL teachers in unplanned vocabulary explanations, and states that nonverbal behavior "appears to be a means by which comprehensible input can be provided to L2 learners" (p. 109). In her extensive study of CLIL interaction in Viennese High Schools, Dalton-Puffer applies a 'multi-perspectival approach' (2007, pp. 42) and devotes a whole chapter to explanations, where she describes the macro-structure of explanations using systemic-functional categories (ibid. pp. 139). Dalton-Puffer discusses the complexity of defining what an explanation or 'explaining' is, and concludes that "explaining has to do with demonstrating understanding and being explicit" (2007, p. 155). With regard to her broad collection of data, Dalton-Puffer points out that in general, students receive very little input in terms of coherent oral explanations. The explanations they produce themselves are often minimalist, seemingly due to the asymmetric distribution of knowledge leading to the assumption that a simple utterance is enough "to serve as a trigger in order to activate the right kind of conceptual pattern in the teacher's mind" (ibid. p. 151). However, in contrast to implicit requests for an explanation, e.g. through

[3] In this paper, the terms 'non-verbal', 'verbal', 'para-verbal' resources are used, acknowledging the linguistic bias which these terms suggest, but emphasizing the holistic approach taken. For further discussion see Selting (forthcoming).

a why-question, a teacher's precise formulation of the activity to be accomplished seems to be decisive for more complex elaborations: "Notwithstanding individual exceptions, one can generalize that if a teacher's invitation includes the wording *explain*, it is more likely that the response will actually be a coherent explanation than in cases where the initiation is worded without it […]" (ibid. p. 157). In the present case study, it will be shown in detail how a CLIL student, whose explicit task is to 'explain', accomplishes the activity by using an array of finely coordinated multimodal resources, and by making collaboration with the other participants relevant; a capacity which may not have been recognized and foregrounded enough yet.

It has been shown in CA studies that, i) nonverbal resources such as the establishment of an interaction space through body positioning (Stukenbrock, 2009a), and ii) recipients' reactions such as backchannel signals (Harren, 2009), play a decisive role in the course of explanations. Hence, the 'explaining' has already been described as a fundamentally collaboratively achieved activity (Seedhouse, 2009; Stukenbrock, 2009a; Harren, 2009). Stukenbrock (2009a, p. 161) defines an 'explanation' as an everyday practice used to establish coherence among various characteristics, outcomes, and causes, a practice being realized in interaction by someone for someone. However, drawing on the conversation-analytic idea of revealing participant's categories, the aim of this paper is to analyze what is made relevant and accepted by the participants themselves as an explanation or 'explaining' (Hutchby and Wooffitt, 1998, p. 15).

4. Sample analysis

This case study is based on the video-recording of a geography lesson taught in English in 10th grade at a High School in Hanover, Germany. The recordings were made in 2003, during a videography project at the English Department of the Leibniz University Hanover. The teacher was trained in English and Geography. The students recorded had been learning English for six years, and the High School offered a CLIL branch leading the students to final secondary-school examinations in English in specific subjects. The lesson's topic at the moment of the recording was 'coastal features'. The transcript follows the notation conventions of *Gesprächsanalytisches Transkriptionssystem* 2 (GAT) (Selting et al., 2009). According to the GAT notation conventions, each intonation unit is notated in a separate line (segment); an intonation unit is realized in one cohesively perceived intonation contour and shows at least one focus accent. The transcription conventions allow for a precise notation of prosodic features and voice quality. Aspects of turn-taking such as overlap or latching are shown, too. In the extracts shown below, nonverbal behavior and its alignment with verbal resources are transcribed in separate line and by using a different font. In order to depict the interaction in its holistic gestalt, stills are integrated into the transcript[4]. The transcription conventions and a coherent transcript of the whole sequence are listed in the appendix. Extracts relevant for the analysis will be presented in the following sections.

In the first extract, the teacher creates what Seedhouse (2009, 67) calls a 'procedural context' in the language classroom: the teacher tells the students what they are supposed to do. In these

[4] Stukenbrock (2009b) discusses the advantages and disadvantages of two kinds of multimodal transcripts: a) integrated stills in the verbal transcript, and b) symbolic transcripts where each visual resource is transcribed in its own line in alignment with the verbal transcript. She argues in favor of a combination of both techniques, and calls for a profound discussion and reflection of multimodal transcription processes and techniques by interaction analysts. In this paper, nonverbal behavior is transcribed where it is shown to be relevant for participants (and hence for the analysis) in order to make the ongoing interaction comprehensible for the reader. In addition to this, stills are integrated into the transcript, acknowledging that the creation of a still is already an interpretative process (Stukenbrock, 2009b, p. 154).

teacher monologues, pauses can occur without the teacher's floor being challenged; in this phase the students cooperate by refraining from talking.

(1)

01	T:	let's stArt well we can start (0.7) well with the ↓TIDES; (0.5)
02 →		uhm (0.3) could you BRIEFly (0.4) repEAt; (0.7)
03 →		And explAIn; (1.1)
04		to the GROUP ↓here;=
05		and uh what (1.3)
06		↑how thIs HAPpens;
07		how this WORKS; (1.7)
08 →		<<p> how the tIdes (2.3) are CAUSED;>
09		(5.8) ((pupils look into their books))
		((Teacher encourages students to participate.))

The teacher makes explicit on a lexico-semantic level that she wants the students to repeat (segment 2) what they talked about the lesson before, and to explain (segment 3) to the class how the tides are caused (segment 8). After a long period of silence and encouragement from the teacher, two students raise their hands and make a few remarks on the topic. The teacher then addresses one of them, Lucas, and asks him to draw a short sketch (segment 13). Later, she asks him to explain (segment 17).

(2)

13	T:	<<all> if you could you make > (.) uh: yeah a shO:rt (0.5)
		SKETCH;
14		mayBE,
		(...)
		((Lucas hesitates, his fellow students laugh. No one else volunteers to fulfil the task, so the teacher encourages Lucas again until he agrees.))
15	T:	so plEAse come aLONG;
16		(with that) transpAreny HERE,
17		and you exPLAIN;
18		↓PLEASE;
19	Luc:	((goes to the overhead projector, leans over it and starts to draw two circles))

Still 1: Lucas draws on transparency

Still 2: Lucas' drawing (description added by MK)

In the course of the following interaction, Lucas deploys a cluster of verbal, para-verbal, and nonverbal resources to provide the explanation requested by the teacher. The finely tuned intrapersonal coordination of these resources shall be demonstrated by three examples in section 4.1. In section 4.2, the collaborative aspect of the activity will be looked at.

4.1 Meaning making through the coordination of unlike resources[5]

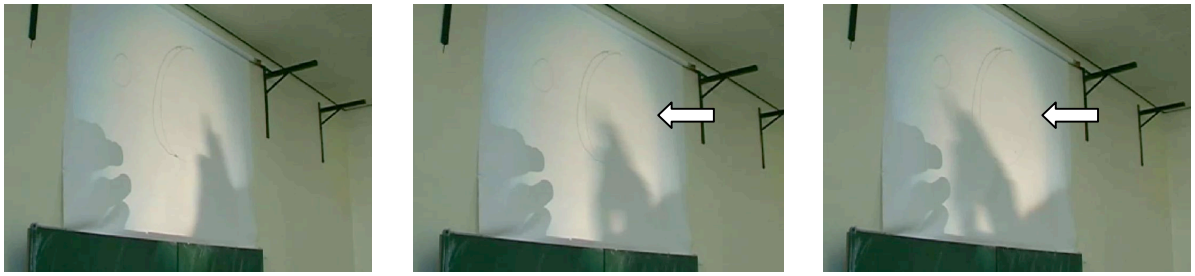
In extract 3, it becomes obvious how the sketch Lucas has been drawing is integrated into the activity through both lexico-semantic and gestural references:

(3)

30	Luc:	And (--) °h so there_is_a little
31		(1.7) ((hesitates while drawing))
32	X:	<<p> BULGE;>
33	Luc:	|[bul [BULGE;
		|[((drawing a bulge))
34	T:	[BULGE:;
35	Luc:	(1.0)
36 →		<<p> here;>
37	Luc:	(0.6)
38		it's too BIG-
39		(0.5)

[5] Term coined by Charles Goodwin 2010 in his plenary "Building action by combining unlike resources" at the International Conference on Conversation Analysis (ICCA), July 4th-8th 2010, Mannheim, Germany.

40 but (1.1) just to SHOW that the water is |[(0.7) uh pUlled (-)
→ |((indicating the direction of the water with his hand))
41 X: [((fingers snapping))
→ Luc: in thIs direction;



Still 3a-c: Lucas indicates the direction of the water (segment 40) (Arrows indicate the direction of the hand movement.)

In segment 36, Lucas explicitly refers to the sketch using the deictic word 'here' and even makes a meta-communicative comment on his drawing of the 'bulge': it's too BIG- (segment 38). On the nonverbal level, as shown in the stills, he indicates with his hand the direction of the water from left to right. His utterance in thIs direction; (segment 40) can only be understood in coordination with this gesture. So it is the coordination of lexico-semantics and gestures and the constant references to the sketch which make Lucas' utterances coherent and meaningful[6].

In the following extract, quite similar observations can be made with respect to lexico-semantics, gestures, and changes of body position. This time, Lucas describes the position of the sun with regard to the moon and the Earth:

(4)

45 Luc: A:nd- (-)
46 YES;
47 (1.1)
48 the SUN is |somewhere he:re,
|((backing away from the projector, still orienting towards it))
49 Luc: | <<smiley voice> BIG,>
|((making large arm movements in forward motion))
50 X: [((laugh))
51 Luc: [AND uh
52 it (.) ALso affects uhm the wAter,

[6] The finger snapping in the background (segment 41) is not explicitly paid attention to. However, it indicates that a fellow student desires to add and/or comment on Lucas' activity.

In segment 48, Lucas again uses the adverb ‘here’ as a deictic device; in this case however, not as a reference to the drawing on the transparency, but as a reference to his body position. Lucas reconfigures the spatial arrangement by backing away from the projector, though constantly orienting himself towards it, and by making large arm movements between himself and the projector. This way, as shown in still 4, he creates a new, larger interaction space which allows him to ‘perform’ his activity.

Still 4: Lucas creates a new interaction space (segment 51)

Within this new interaction space, he depicts the distance between the ‘Earth’ (the sketch on the projector), and the ‘sun’ (depicted through gestures in front of him), as well as the sun’s size, by his voluminous gesture and the lexico-semantic description: `<<smiley voice> BIG,>` (segment 49.). It is the cluster of verbal and nonverbal resources and the incorporation of the sketch on the projector[7], which makes this descriptive part of the explanation, the proportions of the elements sun, moon, and Earth, interpretable. The laughter of the classmates during this sequence can be interpreted as a comment on Lucas’ ‘unconventional’ resources. However, no problems of understanding are made relevant at this point of the activity.

Extract 5 reveals the finely tuned coordination of prosody, lexico-semantics, and gestures. Lucas has so far described the configuration of elements, but the teacher asks him to be more precise (segments 61ff), so Lucas on a lexico-semantic level establishes a causal relationship between the elements (segments 66ff):

(5)

```
61    T:    what HAPpens to these big bUlges;
62          (1.3)
63          [of WAter;
64    Luc:  [(X X)
65          (1.8)
66          they're (0.3) they’re pUlled (0.4) uhm to the MOON,
67          and when the moon uhm
```

[7] It is interesting to note that Lucas positions himself with regard to the sketch on the projector instead of the projected image on the wall.

68 (1.0) ((moves his arms in a circle before him))
69 X: <<p> CIRcles-
70 Luc: |CIRcles around the EArth,
|((moving his arms in another circle before him))
71 → a:nd the wAter (0.3)|goes WITH the moon,
|((circular arm movement with a higher apex than in circles before))
72 → |A:nd- (1.2)
|((holds the gesture))
73 → <<strong articul.> |↓THAT causes the tIdes:;>
|((releases the gesture, gazes at teacher))

Still 5a-c: Lucas' circular arm movement (Arrow indicates the direction of the hand movement.)

In this section, the intrapersonal coordination of verbal, para-verbal, and non-verbal resources in segments 71ff shall be focused (segments 66ff are discussed from a different perspective in section 4.2a). The turn-constructional unit in segment 71 is realized with mid-rising intonation at the end of the unit. Parallel to his utterance, Lucas makes a circular movement with his right hand, which ends in a higher apex than in the circles he has realized before. The apex of the gesture is held in segment 72, when Lucas realizes the conjunction A:nd- and leaves a 1.2 second pause. The lengthening of the vowel in the conjunction and its level intonation project more to come. Following the pause, Lucas releases his gesture and starts directing his gaze to the teacher while realizing the turn-constructional unit (TCU) <<strong articul.> ↓THAT causes the tIdes:;>, with a pitch step down and the anaphoric item 'that' accented. The prosodic form of the utterance – through strong articulation, pitch jump down, and narrow focus, as well as the direct addressing at the teacher – make Lucas' utterance interpretable as an 'end of sequence' statement by which Lucas suggests that he has fulfilled the task (for a discussion of the following turns, see 4.2b).

Extracts 3 to 5 show that the social activities 'describing' and 'explaining' can merge in interactive processes (see also Stukenbrock, 2009a). Interesting to note is the variation of resources involved in these activities. In extracts 3 and 4, Lucas describes the positions of the elements 'Earth', 'Bulge', 'Moon', and 'Sun', and the movement of the water by coordinating lexico-semantic and prosodic resources, as well as gestures and body positions, creating a large interaction space and including references to the sketch on the projector. In extract 5, where Lucas shifts from describing to explaining, he deploys precisely coordinated verbal, para-verbal, and nonverbal bodily resources, but reduces the interaction space and no longer

includes references to objects. In either phase of the activity, it is important to analyze the whole cluster of resources involved, as all communicative modes, bodily and non-bodily, play a part in the construction of meaning. In this section, the intrapersonal coordination of resources was focused on; the next section deals with the collaborative aspect of the activity of 'explaining', where meaning is cooperatively negotiated on a language and on a content level.

4.2 Meaning making through collaborative action

a) Students' resources to deal with language problems

One important aspect of the analysis is to show how the student deals with language problems by making collaboration relevant. In general, in the whole activity, Lucas' verbal pauses are quite long, often a second or more. Therefore, it seems worthwhile to examine the nonverbal resources deployed during those pauses.

(6)

30 Luc: And (--) °h so there_is_a little
31 (1.7) ((hesitates to continue drawing)) →
32 X: <<p> BULGE;>
33 Luc: |[bul [BULGE;
|[((drawing a bulge))
34 T: [BULGE:;
(...)

Still 6: Lucas points (Circle indicates pointing)

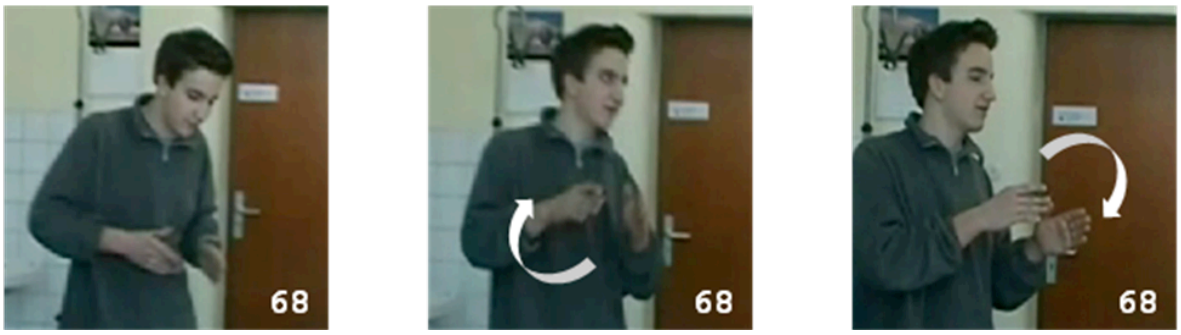
Lucas' 1.7 second pause (segment 31) is filled by his obvious hesitation to continue his drawing. Several times he points with his pen to the transparency. His hesitation is treated as a word search by a fellow student as she provides the prompt <<p> BULGE;> in piano voice (segment 32). This is then taken up by Lucas who repeats and simultaneously draws (segment 33), and the teacher (segment 34). In this example, as Lucas self-initiates other-repair through 'pointing', it becomes obvious that Lucas' 'explaining' is a thoroughly recipient-designed activity. As we know from the teacher's introduction of the task (extract 1), the topic 'how the tides are caused' has already been discussed in the lesson before. Lucas clearly refers to the students' background knowledge and makes it relevant by pointing at the exact position of the 'bulge', thereby displaying this item as the trouble source in need of repair.

It is worthwhile to reconsider segments 67ff, where other-repair is self-initiated by Lucas through an iconic gesture:

(7)

66 Luc: they're (0.3) they're pUlled (0.4) uhm to the MOON,
67 and when the moon uhm
68 → (1.0) ((moves his arms in a circle in front of him))
69 → X: <<p> CIRcles-
70 Luc: |CIRcles around the EArth,

| ((moving his arms in another circle in front of him))



Still 7a-c: Lucas' circular arm movement II (Arrows indicate the direction of the hand movement.)

In segment 68, Lucas fills the 1.0 second pause with the iconic gesture of a circle. Important to note is also Lucas' withdrawal of gaze and 'thinking face' (Goodwin and Goodwin, 1986, pp. 57), which often occur in word searches. The combination of the hesitation signal 'uhm', the pause, the 'thinking face', and the gesture is treated as a word search by a fellow student who prompts the verb <<p> CIRcles- (segment 69). Again, it is taken up and repeated by Lucas, which confirms the interpretation of a word-finding problem.

Another display of a language problem can be found in the following extract, where Lucas precisely describes the distances between the moon, the sun, and the Earth. In segments 55f, he makes a concluding remark:

(8)

```
53     Luc:  bUt the the the_MOON (0.9) is is three hundred thousand
             kilometres awAy from the EArth, (0.5)
54           and (.) th the sun is about a hundred and fifty !MILL!ion
             kilometres away, (0.6)
55 →         so: (0.8) just to |to shOw the (0.9) <<creaky> the uhm- > (1.9)
                               | ((looking downwards, playing with pen in mid-bodily position))
56           <<p> ↓yes the ´DIStance;> (0.6)
57 →   T:    exTREME dIstan[ces;
58     Luc:                [the exTREME dIstances;
59           yes;
```

The TCU in segment 55 is realized with two long pauses, and ends with the filling device uhm, realized in creaky voice, and a further long pause. These resources contextualize a speech-production problem. During the 1.9 second pause, Lucas continues to look downwards to the transparency on the projector, and to play with a pen, holding his hands in a mid-bodily position. In contrast to the examples above, Lucas does not 'fill' his pause 'efficiently' through non-verbal resources; he does not provide a hint of his trouble source that might be interpretable for the recipients. As a consequence, there is no prompt, either by the other pupils or by the teacher. After a very long 1.9 sec pause, Lucas self-selects[8] and adds in piano voice: <<p> ↓yes the ´DIStance;> (segment 56). Though syntactically and semantically

[8] For details on the turn-taking system, see Sacks, Schegloff/ Jefferson, 1974, p. 704.

'complete', the marked prosodic form of Lucas' TCUs contextualizes a speech-production problem. The teacher also treats his hesitation signal and long pause as problematic by repeating his last word and adding an adjective: `exTREME dIstances;` (segment 57). Retrospectively, from the syntactic position of the pause, she can interpret the repairable. The emphasis on the adjective signals this item as the potentially lacking one. Lucas confirms this by repeating the whole noun phrase in a prosodically matched form using a similar intonation contour (segment 58), and the agreement token `yes;` (segment 59).

Goodwin and Goodwin (1986) state that "searching for a word is not simply a cognitive process which occurs inside a speaker's head but rather is a visible activity that others can not only recognize but can indeed participate in" (p. 52). In the examples provided so far, Lucas uses various resources to make a word search interpretable and to initiate other-repair. The word searches are made obvious through pauses; pointing and gesturing make the problem sources interpretable for the recipients, who can then engage in the interaction by providing prompts (extracts 6, 7). When Lucas 'fills' his pause only by looking downwards and playing with his pen (extract 8), he does not receive any help from his fellow students. Obviously, in the cases dealt with, they can only engage in other-repair if they are provided with clues which make the trouble source interpretable. In extract 8, it is the teacher who treats Lucas' (syntactically and semantically finished) utterance as incomplete by making an expanded noun phrase relevant in a next-turn position.[9]

b) Students' resources to deal with content problems

In the course of Lucas' explanation, there seems to be another kind of trouble, which is made relevant by what can be called a 'display of uncertainty with regard to content'. As shown in extract 5, the teacher asks: `what HAPpens to these big bUlges;` (segment 61) and, therefore, pushes Lucas to elaborate on his activity. In segments 64ff, Lucas tries to establish a causal relation between the movement of the water and the movement of the moon by using the verb "to cause" (segment 73). This way, he makes his utterances relevant as 'doing explaining', directly addressed at the teacher through gaze.

(9)

```
73    Luc:  <<strong articul.> |↓THAT causes the tIdes:;>
                                |((gazes at teacher; releases the gesture))
74          (0.9)((wrinkles his mouth)) ——————————→
75          <<p> i THINK;> (looks downwards)
76    X:    ((a little laughter))
77          (1.7)
78    T:    XEnia;
79          you [would lIke to HELP him? (0.3)
80    Xen:      [YES;
```

Still 8: Lucas wrinkles his mouth

[9] The pause at the end of segment 55 in extract 8, provides a possible opportunity for other-repair which is not used. Instead, Lucas self-selects and finishes semantically and syntactically his turn. The teacher's intervention only takes place in the next TCU. Based on a comparison of extracts 6, 7, and 8, assumptions on the preference organization of other-repair could be made, as it seems that other-repair by fellow students is preferred to other-repair by the teacher. Yet, further analyses of CLIL interaction are needed to substantiate this hypothesis.

However, after having established this causal relationship, directly addressed at the teacher in segment 73, Lucas withdraws his gaze to look downwards and wrinkles his mouth (segment 74).[10] He then makes his uncertainty explicit through the hedge <<p> i THINK;>. The subdued realization of this verbum sentiendi, the downward gaze, and the release of body tension make a problem interpretable. The uptake by the teacher reveals that she treats Lucas' 'explaining' as unfinished, as 'in need of help,' by giving the floor to another student (segments 78f) who adds further elements relevant for the causation of the tides (segments 80ff, see appendix).

The examples discussed in 4.1 and 4.2 show that Lucas' explanation can only be accomplished in a collaborative process in which Lucas, his fellow students, and the teacher actively engage. At various points of the activity, Lucas deploys multimodal resources to make other-repair relevant, and thus uses this collective engagement in order to accomplish his task. Thus, visual resources need to be analyzed – next to verbal resources – within the activity's sequential structure, in order to understand how the activity of 'explaining' is collaboratively achieved.

5. Discussion

The overall sequential organization of the activity shall be reconsidered in order to understand what is accepted by the participants as an instance of 'explaining':

01-19	procedural context introduced by teacher 'draw a sketch' and 'explain'
20-59	descriptive part by Lucas (in-between: students' finger snapping indicates non-acceptance)
60-63	further question by teacher (indicates non-acceptance)
64-75	further description and creation of coherence, display of uncertainty by Lucas
76-77	laughter by fellow students (indicates non-acceptance)
78-79	teacher selects another student to 'help'
80-87	other student mentions further parameters
88ff.	teacher repeats and accepts

The tasks to 'draw a sketch' and 'explain' are made explicit by the teacher in the beginning of the sequence. However, what Lucas provides is not immediately accepted as such. Ongoing finger-snapping in the background indicates that other students would like to add and/or comment on Lucas' utterances, and the teacher's questioning in segments 60ff (extract 5) reveals that Lucas' rather descriptive activities so far do not correspond to what she expects. Rather, the teacher provides opportunities for him and other students to collaboratively elaborate on the 'explaining'. In the course of the activity, teachers and students orient to the complexity of CLIL interaction by blurring the boundaries between a) form-and-accuracy

[10] At this point, it would be important to see the facial expression of the teacher, which might help to better understand why Lucas withdraws his gaze, e.g. if it was a 'skeptical' facial expression which led Lucas to the assumption that his explanation was not right. Whether or not Lucas' withdrawal of gaze and the subdued utterance was a reaction to a 'skeptical' face, it becomes obvious in the course of the sequence that the teacher does not interpret the explanation as finished.

contexts, where the focus is on linguistic form and real-world meaning is excluded, and b) meaning-and-fluency contexts, where the purpose is "to maximize the opportunities for interaction" (Seedhouse, 2004, p. 149). In the 'explaining' at hand, all participants are involved in achieving the activity collaboratively, therefore they orient towards the conjoint construction of content meaning, and only where it is made relevant by the participants themselves, there is an occasional change to focus on form. Thus, it is suggested that the participants' capability to smoothly navigate from one context to the other is decisive for CLIL interaction.

As mentioned above, in previous studies on explanations, the role of i) the establishment of an interaction space through body positioning, and ii) recipients' reactions such as backchannel signals, has been stressed (e.g. Stukenbrock, 2009a; Harren, 2009). This study reveals that the deployment of resources of enduring materiality, such as the incorporation of sketches, needs to be analyzed, too, as it is decisive to understand the activity in its holistic gestalt. It has been shown that an 'explaining' can be accomplished through modal complexity (Norris, 2004), the student's finely tuned coordination of multimodal resources. As Streeck (1996) has pointed out, we do things with things: "When we need to symbolize something, we take whatever material comes our way. It is the transfer, the schematic projection, that counts, because it is what we call 'making sense.'" (p. 383). Especially in a CLIL context this might be a valuable strategy: if students can rely on various bodily and non-bodily resources, they may have better chances to overcome the challenges they face linguistically and content-wise.[11]

Against the background of the 'output hypothesis' (Swain, 1993, 2005), modest claims can be made with regard to the question whether learning takes place in the present CLIL activity. As Swain (1993) states:

> The implications of the output hypothesis for second language pedagogy are numerous, but they all have in common the absolute necessity of providing learners with considerable in-class opportunities for speaking and writing. But just speaking and writing are not enough. Learners need to be pushed to make use of their resources; they need to have their linguistic abilities stretched to their fullest; they need to reflect on their output and consider ways of modifying it to enhance comprehensibility, appropriateness and accuracy. This can be accomplished both through teacher-led and collaboratively structured sessions (pp. 160).

Swain (2001) stresses the role of collaborative tasks for second language learning as they provide opportunities for the students to "notice gaps in their linguistic knowledge as they try to express their intended meaning leading them to search for solutions" (p. 60). That way, students are pushed to reflect upon their knowledge and revise it – collaboratively. In that sense, Lucas' explanation has potential to yield second language learning. Several instances of word search and prompting are shown in the analysis. These word search sequences indicate gaps in the learner's repertoire or knowledge, linguistic or content-wise, which are collaboratively bridged. In the case of "bulge" (segments 32ff) and "circle" (segments 68ff), it may be assumed that the trouble is on a lexical level as Lucas provides access to the concept

[11] It is remarkable that the whole activity is achieved without code-switching, obviously because word searches can be compensated through other-repair initiated by nonverbal resources. A sample analysis of a Biology class taught in English in 8th grade has shown that students' descriptions do not do without code-switching. Hence, the resources used by students to fulfill activities such as descriptions and explanations seem to vary according to the language proficiency. In future research, this should be explored more systematically.

through nonverbal means such as drawing and circling. In the case of "extreme" (segments 55ff), Lucas does not make anything relevant that could be interpreted by the fellow students as a hint at the lacking item, however, the repairable provided by the teacher is accepted by Lucas. In each of the cases of word search, Lucas repeats the prompts provided, and imbeds them systematically in the structure of his TCU, on a syntactic and on a prosodic level. As this is not a longitudinal study, no remarks on long-term learning effects of this collaboratively achieved activity can be made. However, it can be shown that Lucas is enabled on a local, sequential level to continue his activity by adequately using prompts he has been provided with.

Thus, a study drawing on the methods of Conversation Analysis, Interactional Linguistics, and Multimodal Analysis enables us to understand how a social activity can be achieved collaboratively by participants in a specific language-learning environment like CLIL. A sequential, multimodal analysis based on video-recordings of naturalistic classroom interaction is needed to reveal the subtle resources students deploy to construct meaning, in collaboration with the teacher and fellow students, in the course of the activity of 'explaining'. Even though the collaborative aspect of the explanations has been pointed out in former studies, it needs to be stressed here again, as it is the cooperation between students which makes the activity coherent, with language and content problems being displayed through pauses, facial expression, pointing, and gesture, and resolved by other participants through prompts and additional comments. Taking findings like these into account, CLIL teachers should be encouraged to create opportunities for students to make use of various, multimodal resources, allowing for the explainer and the class to collaboratively negotiate subject-related content as well as linguistic form.

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Appendix

Full transcript 'Explain how the tides work'

Recording: Geography in English (10th grade) – 'Spring tides' (2003)
Participants: Luc – Lucas
Xen – Xenia
T – Teacher
X – unknown student(s)
Transcript: Maxi Kupetz
Conventions: GAT 2 (Selting et al., 2009)

```
{0:05}
01  T:    let's stArt well we can start (0.7) well with the ↓TIDES; (0.5)
02        uhm (0.3) could you BRIEFly (0.4) repEAt; (0.7)
03        And explAIn; (1.1)
04        to the GROUP ↓here;=
05        and uh what (1.3)
06        ↑how thIs HAPpens;
07        how this WORKS; (1.7)
08        <<p> how the tIdes (2.3) are CAUSED;>
09        (5.8) ((pupils look in their books))
10        <<h> DON'T be afrAId;>
11        just START and somebody else will go O:n;> (0.4)
12        no PROblem;
          ((Teacher looks at the class, while many students look into their books. One student mentions
          parameters involved in the tides, and Lucas adds something.))
{1:06}
13  T:     <<all> if you could you make > (.) uh: yeah a shO:rt (0.5)
          SKETCH;
14        mayBE,
          ((Lucas hesitates, his fellow students laugh. No one else volunteers to fulfil the task, so the
          teacher encourages Lucas again until he agrees.))
{1:50}
15  T:    so plEAse come aLONG;
16        (with that) transpAreny HERE,
17        and you exPLAIN;
18        ↓PLEASE;
19  Luc:  ((goes to the overhead projector, leans over it and starts drawing a small circle on the
          transparency))
          (...)
{2:09}
20  Luc:  <<p> okAy;
21        thIs is the MOO:N,>
22  T:    <<p> speak UP,
23        PLEASE;>
24  Luc:  thIs is the ↑MOO:N;
25        ((continues drawing, pupils laugh))
26        |thIs is the ˈEARTH;
          |((drawing a large circle))
27        (1.3) ((finishes the drawing of the big circle))
28        ((pupils laugh))
```

```
29          |And (.) the moon affects: the water ON the EArth- (-)
            |((referring with a pen to the drawing of the earth))
30          And (--) °h so there_is_a little
31          (1.7) ((hesitates to continue drawing))
32  X:      <<p> BULGE;>
33  Luc:    |[bul [BULGE;
            |[((drawing a bulge))
34  T:           [BULGE:;
35  Luc:    (1.0)
36          <<p> here;>
37  Luc:    (0.6)
38          it's too BIG-
39          (0.5)
40          but (1.1) just to SHOW that the water is |[(0.7) uh pUlled (-)
                                                     |((indicating the direction of the
                                                      water with his hand))
41  X:                                                [((fingers snap))
    Luc:    in thIs direction;
42          and (.) there's a bulge (-) <<all> another bulge on- > (0.8)
43          on <<all> the OTHer side of the EArth,>
44  Xen:    ((snaps her fingers))
45  Luc:    A:nd- (-)
46          YES;
47          (1.1)
48          the SUN is |somewhere he:re,
                       |((backing away from the projector, still orienting towards it))
49          |<<smiley voice> BIG,>
            |((making large arm movements in forward motion))
50  X:      [((laugh))
51  Luc:    [AND uh
52          it (.) ALso affects uhm the wAter,
53          bUt the the the_MOON (0.9) is is three hundred thousand
            kilometres awAy from the EArth, (0.5)
54          and (.) th the sun is about a hundred and fifty !MILL!ion
            kilometres away, (0.6)
55 →        so: (0.8) just to |to shOw the (0.9) <<creaky> the uhm- > (1.9)
                              |((looking downwards, playing with pen in mid-bodily position))
56          <<p> ↓yes the ´DIStance;> (0.6)
57  T:      exTREME dIstan[ces;
58  Luc:                  [the exTREME dIstances;
59          yes;
60  T:      hm_hm, (0.8)
61          what HAPpens to these big bUlges;
62          (1.3)
63          [of WAter;
64  Luc:    [(X X)
65          (1.8)
66          they're (0.3) they're pUlled (0.4) uhm to the MOON,
67          and when the moon uhm
68          (1.0) ((moves his arms in a circle in front of him))
69  X:      <<p> CIRcles-
70  Luc:    |CIRcles around the EArth,
            |((moving his arms in another circle in front of him))
71          a:nd the wAter (0.3) |goes WITH the moon,
```

| ((circular arm movement with a higher apex than in circles before))

72 |A:nd- (1.2)
| ((holding the gesture))
73 <<strong articul.> |↓THAT causes the tIdes:;>
| ((gazing at the teacher; releasing the gesture))
74 (0.9) ((wrinkles his mouth))
75 <<p> i THINK;>
76 X: ((a little laughter))
77 (1.7)
78 T: XEnia;
79 you [would lIke to HELP him? (0.3)
80 Xen: [YES;
81 yes;
82 but it's not (.) ONly the wAter,
83 but Also the ATmosphere,
84 the SOIL,
85 (0.5)
86 a:nd the surface of EARTH's Also (0.3) going with the wAter;
87 (1.5)
88 T: so:_c (0.7) CIRCling,
89 SPINNing around its aXI:S, (0.6)
90 u:hm [(0.8) that's Also very important ↑ONE;
91 X: [((clearing his/her throat in the background))
[...]

Transcription conventions (GAT2)

(for details see Selting et al., 2009; slightly adapted by MK)

Sequential structure	
[ ]	overlap and simultaneous talk
[ ]	
=	latching
Inhalation/Exhalation	
°h / °h	inhalation/exhalation of ca. 0.2 - 0.5 secs.
°hh / °hh	inhalation/exhalation of ca. 0.5 - 0.8 secs.
°hhh / °hhh	inhalation/exhalation of ca. 0.8 – 1.0 secs.
Pauses	
(.)	micropause
(-), (--), (---)	brief, mid, longer pauses of ca. 0.25 - 0.75 secs.; until ca. 1 sec.
(2.0)	measured pause, more than ca. 1 sec. duration
Other segmental conventions	
and_uhm	assimilations within units
:, ::, :::	segmental lenghtening, according to duration
uh, uhm, etc.	hesitation signals, so-called 'filled pauses'
ʔ	cut-off with glottal closure
Accentuation	
akZENT	strong, primary accent
ak!ZENT!	extra strong accent
akzEnt	weaker, secondary accents
Pitch at the end of intonation units	
?	rising to high
,	rising to mid
-	level
;	falling to mid
.	falling to low
Notation of pitch movement in and after accented syllable	
`SO	falling
´SO	rising
¯SO	level
ˆSO	rising-falling
ˇSO	falling-rising
Changed register, end indicated by final '>'	
<<l> >	low register
<<h> >	high register

Changes in loudness and speech rate, end indicated by final '>'

<<f>	>	forte, loud
<<ff>	>	fortissimo, very loud
<<p>	>	piano, soft
<<pp>	>	pianissimo, very soft
<<all>	>	allegro, fast
<<len>	>	lento, slow

Other conventions

((nods))		non-verbal and extralinguistic activities and events
|((	))	starting point of coordination of nonverbal and verbal activities
<<noddingly>	>	concomitant para- and extralinguistic activities and events with notation of scope
<<whispery>	>	description of voice quality
( )		unintelligible according to duration
(X X X)		number of unintelligible syllables