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Can You Describe Your Pain?

Combining Psycho-emotional and Pragmatic Analysis on Cancer Patients' Utterances

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Abstract

This contribution is part of a wider research concerning Automatic Pain Assessment (APA), whose goal is to collect and analyse multimodal (audio and visual) data and to pave the way for more effective and personalized pain management strategies through innovative and multidimensional approaches. The APA project is dedicated to advancing innovative strategies grounded in artificial intelligence methodologies, with a central focus on probing pain features.

In this frame, the specific focus of this proposal is a pragmatic analysis of oncological patients' utterances through the implementation of a modified version of the Kübler-Ross's 5 grief stages model and a pragmatic classification scheme with 5 macro-types (assertion, direction, expression, rituals, dialogic moves) and, for each of these, a complex set of sub-type labels. A detailed analysis of the annotation results is presented, both separately and considering their relative covariation. The study provides a deeper understanding of an individual's pain experience. This, consequently, has practical importance as it facilitates the development of superior techniques to increase individual well-being and general health.

Keywords: Pain expression, Pragmatics, Grieving stages, Linguistic acts, Labelling system

1. Introduction

A holistic strategy for pain management typically encompasses both pharmaceutical and nonpharmacological methods, tailored to meet the specific requirements of each patient. Meticulous pain evaluation is crucial to guide the therapeutic decision-making process (Shkodra et al., 2022). Traditionally, clinicians rely on subjective pain measures, such as the

Numerical Rating Scale (NRS) or Visual Analogue Scale (VAS), and continually adjust medication dosages according to the patient's responses (Brunelli et al., 2020). However, these scales, though widely used, fail to account for the multidimensional and emotional nature of pain, especially in cancer patients, where pain perception is heavily modulated by psychological distress, disease progression, and communicational difficulties (Cascella et al., 2023a). Moreover, although self-report quantitative approaches, such as the Numeric Rating Scale (NRS) and Visual Analogue Scale (VAS), are considered the benchmark for pain evaluation (Chien et al., 2013), they are inherently limited. They are prone to biases such as catastrophisation or minimisation (Kristiansen et al., 2013) and are inadequate for non-verbal individuals or those with cognitive impairments. These limitations reveal a critical gap in current pain assessment: the lack of integrative models that account for emotional, cognitive, and linguistic factors. Recent literature has begun to acknowledge this complexity, with some studies employing mixed-method approaches, such as attempting to incorporate patient-reported outcomes and experiences (PROMs and PREMs) into oncology care (Pellegrini et al., 2020). While Cascella (2023b, 2024) emphasises the influence of psychological and emotional factors on pain perception, current assessment methods have not evolved to incorporate these insights into practical, clinical tools. Similarly, while AI and machine learning are increasingly explored in pain research, to develop models centred on automatic and objective reactions (Prkachin et al., 2021), most existing models focus on facial expressions or physiological signals, without fully leveraging language as a rich source of emotional and psychological data. This study builds upon these insights by posing a novel interdisciplinary framework that combines psychological theory, linguistics, and AI. Unlike prior research, it explicitly integrates Kübler-Ross's stages of grief into the analysis of patient utterances, positing that emotional states influence both pain perception and verbal expression (Cosio et al., 2019; Wu et al., 2021). This decision is based on current clinical research that revisits the Kübler-Ross model not as a rigid sequence, but as a flexible and dynamic framework for emotional processing in terminal illness (Tyrrell et al., 2023).

Our approach is grounded in an established work in discourse analysis, emotional expression, and pragmatics. Borelli's (Borelli et al., 2018) framework on linguistic markers as indicators of psychological states in emotional discourse, align closely with this study's emphasis on the pragmatics of pain-related language. Moreover, Cresti and Moneglia's Language into Act Theory (L-AcT) (Cresti et al., 2018) provides the structural foundation for analysing speech acts in real-life settings. However, while these linguistic models have proven valuable in corpus linguistics and theoretical pragmatics, they have been rarely applied within clinical contexts, especially in pain research. This study addresses that gap by integrating these established linguistic frameworks with clinical challenges, suggesting a hybrid model capable of enhancing current diagnostic tools, not replacing them by any means, by augmenting their sensitivity to the emotional dimension of pain.

2. Method

This section outlines the methodological approach adopted to investigate the linguistic and affective dimensions of pain-related discourse in cancer patients. The study is situated within the broader framework of the Automatic Pain Assessment (APA) initiative (Cascella et al.,

2023a, 2023b, 2024), which aims to develop multidimensional models for pain analysis by combining psychological theories, pragmatic linguistics, and computational tools. The comprehensive methodological design described below includes interview protocol, dataset composition, transcription procedures, and annotation frameworks, all intended to guarantee replicability, transparency, and analytical rigour. Collected through semi-structured interviews, the data were transcribed using CLIPS standards (Savy, 2006) and annotated in ELAN software (Version 6.9 https://archive.mpi.nl/tla/elan). Transcriptions were segmented into utterances based on prosodic, syntactic, and semantic cues. Each utterance was subsequently annotated at two levels - emotional stage (a modified version of Kübler-Ross, 1969) and vocal act function - by different groups of evaluators (clinicians, psychologists, and linguists). Annotation reliability was statistically assessed via Fleiss' Kappa by the R software (Lusseau 2023 - R Core Team - Version 4.3.3, 2022 https://cran.r-project.org/). This layered design guarantees analytical robustness, establishing a replicable benchmark for future interdisciplinary pain assessment research.

2.1 Questionnaire Structure and Dataset Description

The interview's structure comprises an ad-hoc questionnaire, designed by a team of psychologists, and delivered to participants by a nursing MA student, who also managed the recording process. The purpose of the questionnaire, reported below, was to collect demographic, clinical, and psychological data, as well as colour-pain associations.

APA QUESTIONNAIRE

1. How old are you?
2. What's your job?
3. Are you married?
4. How many people make up your household? How many sons and daughters do you have?
5. When did you receive your diagnosis?
6. What therapy have you or have you had carried out?
7. Do you have any passions? What do you like to do in your spare time?
8. Could you please describe your pain to me?
9. Where is it located?
10. Could you please describe to me the last pain-related episode you had? When did it happen, what kind of pain was it, and how long did it last?
11. What does your pain resemble? Could you try to describe it through words, real-world objects, or metaphors?
12. If you could describe pain with any colour, which one would it be?

14. How would you like to spend this day?

Through this questionnaire, 14 interviews were collected and video-recorded, for a total amount of 28.7 minutes of recording (average length: about 2 minutes). All participants were diagnosed with cancer at the time of the interview and were undergoing treatment at the "Fondazione Pascale" hospital in Naples (South of Italy). The dataset shows a balance of gender, with equal numbers of men and women (7 each), and age, with an average age of 59 for men and 60 for women.

The data were first transcribed using automatic transcription tools and subsequently checked manually. A transcriber examined and rectified any inaccuracies, following CLIPS standards (Savy, 2006) and guaranteeing that each segment was precisely aligned with the spectrogram in ELAN. The transcription tier was then replicated to establish an additional, identical level, which was subsequently divided into utterances, taking into account both prosodic and syntactic cues. Semantic aspects, including topic transitions and interpersonal references, were also considered in the identification of utterances' boundaries.

2.2 Annotation Schema and Procedure

The 310 utterances thus identified were subject to two types of annotation:

- For the first one, a modified version of Kübler-Ross's five stages model was employed, comprising one non-pain-related label and seven pain-related labels (denial, anger, bargaining, preparatory depression, reactive depression, acceptance, plus a "new" label, called awareness);
- For the second type of annotation, all utterances have been categorised according to the illocutionary force of the linguistic acts they represent, according to the pragmatic classification framework proposed by Cresti (2018) and comprising five macro-types (assertion, direction, expression, rituals, and dialogic moves) along with a detailed array of sub-type labels for each category.

For this study, assertions are defined as utterances articulated by speakers based on their knowledge and cognitive processes, specifically their understanding of the surrounding world and the shared knowledge between the two speakers, to respond and engage with the interlocutor, in this instance, the interviewer. For instance, supporting, communicating, declaring, and responding to a total (yes, no) or partial (wh-) question are all examples of assertions. Directive utterances were characterised as occasions in which patients articulated a distinct aim to direct the conversation's trajectory. This was often achieved by organising events in chronological sequence or by making comparisons with memories. Furthermore, through expressive utterances, the speaker articulates his psychological orientation, conveying his emotions. Finally, with rituals, they denote actions such as greeting, expressing gratitude, and analogous expressions. Conversely, dialogical moves encompass behaviours such as requesting the interviewer to reiterate a question or the patient explicitly restating the interviewer's question while providing a reply. This often results in an ambiguous, concise answer lacking precise details, usually in the format: repetition of the question followed by

"don't know" expressions. As previously stated, these five macro-acts labels were subdivided into 16 micro-linguistic acts, which are presented in Table 1 and exemplified in Table 2.

Table 1. Macro- and micro-linguistic acts used in the pragmatic annotation

Assertion
A1) providing information (i.e., answering a question);
A2) clarification (i.e., elaborating on something that could have been interpreted differently from the patient's original intent);
A3) description;
A4) listing (i.e. *x*, *y*, *z*...);
Direction
D1) recall (i.e., reminiscing a recollection);
D2) presenting events, (i.e., when discussing a sequence of events, they create a sequence with the following structure: *first this occurs*, *then this follows*, *and subsequently*...);
Expression
E1) complain/grievance, (remember 2nd stage Kubler Ross: anger);
E2) contrast, (i.e., perhaps they were able to carry out a specific action before treatment);
E3) easement/relief, (i.e., it is an intrinsic aspect of their experience of pain, as an unpleasant sensation or stimulation may diminish over time;
E4) expressing doubt or being uncertain about something;
E5) softening (i.e., unlike easement, it is not solely focused on the patient; rather, it is somewhat shaped by the surrounding individuals. In certain instances, it may also stem from a reluctance to distress loved ones, leading them to assert, "it is bearable.");
E6) dimension of wishes, often in the form of future desires.
Rituals
R1) greetings (i.e., *good morning*, *goodbye*, and equal expressions);
R2) thanking (i.e., *thank you very much*, and equal expressions);
Dialogical moves
DM1) reiterating the question, either in a direct or indirect manner (i.e., *can you repeat?*, *I didn't understand the question*);
DM2) repetition by the patient + comment/answer, (i.e., interviewer: *Where is the pain located?* Patient: *Where is the pain located? <sp> I don't know*)

Table 2. Examples of macro- and micro-acts in the dataset

Assertion	
A_information_giving	*72 a luglio* (int. 3); *5 persone* (int. 4) (English: in July? – people)
A_clarification	*cioè, s'irradia praticamente* (int. 5) (English: I mean, (the pain) spread itself, in practice)
A_description	*specialmente molto pungente* (int. 9) (English: it is really very picking)
A_listing	*e qua punto, questa testa, orecchio, collo e spalla* (int. 13) (English: right here, (I feel pain) on this head, ear, neck and shoulder)
Direction	
D_recall	*prima che facevo la radioterapia non mi potevo proprio muovere* (int. 6) (English: before starting radiotherapy I was not able to move my body)
D_event_presentation	*ho fatto veri interventi* (int. 12) (English: I had many surgeries)
Expression	
E_complain	*non mi basta mio marito* (int. 10) (English: my husband is not enough)
E_contrast	*e adesso non lo posso fare più mi sono limitato a un piccolo pezzettetto di terreno* (int. 8) (English: I cannot do it anylonger, I must limit myself to a narrow portion of soil)
E_easement	*però comunque il dolore è di meno* (int. 10) (English: but however the pain is less)
E_doubt	*forse anche dovuto alla terapia che ho fatto* (int. 1) (English: maybe it si due also to the therapy I received)
E_softnening	*alcune volte sopportabile* (int. 2) (English: sometimes I can bear it)
E_wish	*desidero solo guardare le mie figlie* (int. 10) (English: I just want to look at my daughters)
Rituals	
R_greetings	*Buongiorno, salve…(* English: goodmorning, hallo)
R_thanks	*grazie a lei, di nulla proprio, prego …* (English: thank you, you are welcome, please>)
Dialogic Moves	
DM_repetition request	*in che senso?* (int. 2); (English: what do you mean) *non ho capito la domanda* (int. 13) (English: I did not understand the question)
DM_question repetition + reply	*il dolore dove è situato? <sp> non lo so* (int. 10) (English: Where the pain is felt? <sp> I don't know)

In the annotation procedure, we involved 59 raters, divided into four groups:

- 25 clinicians from anaesthesiology, pain management, and oncology;
- 8 psychologists specialising in neuropsychology, psycho-oncology, psychotherapy, and general psychology;
- 5 linguists, predominantly focused on clinical and general linguistics;
- 21 MA students in linguistics at the University of Naples L'Orientale.

The three groups of experts (aged between 30 and 50 years) were asked to evaluate a collection of utterances obtained from the dataset using our revised Kübler-Ross labels. They had to distinguish between pain-related and non-pain-related utterances and, for the former, identify the stage of grief expressed.

The MA students, after receiving a comprehensive overview of the project and its objectives, were instructed to annotate the utterances according to the pragmatic classification in macro- and micro-acts presented above. Given that all participants were MA students, there was negligible disparity in age among them.

All annotations were collected through online forms, and the utterances were proposed in written form.

2.3 Statistical Analysis

Given the nature of the dataset, in which the evaluation method relies on a categorical scale, the Fleiss' Kappa statistic has been chosen to examine inter-rater agreement across several evaluators. It guarantees that the evaluations given were not the result of chance, but rather of a fundamental logical element. Furthermore, it quantifies the extent to which the observed agreement among raters surpasses the level anticipated under conditions of random rating.

A kappa value of 1 denotes perfect agreement, 0 shows agreement equivalent to chance, and negative values reflect agreement inferior to random chance.

Statistical analysis was performed by the R software, assuming $p<.05$ as statistically significant.

3. Results

This section delineates the study's findings, emphasising the distribution and consistency of Kübler-Ross and pragmatic annotation labels. The results are presented as inter-rater agreement using Fleiss' Kappa statistics (1971) and illustrated through frequency graphs to highlight trends in the pragmatic annotation of pain-related and non-pain-related utterances. The analysis attempts to clarify the correlation between psycho-emotional stages and the linguistic manifestations of pain, providing insights into the pragmatic features of patients' speech. In the following tables (Table 3-5), agreement values on Kübler-Ross labels are reported, also considering different groups of raters. Linguists, constituting the smallest group, were not considered in isolation.

Table 3. Overall Fleiss' Kappa values for Kübler-Ross labels

	Fleiss' Kappa	Z-Score	P value
No pain	0.442	52.528	0.000
Denial	0.079	9.385	0.000
Anger	0.096	11.435	0.000
Bargaining	0.040	4.724	0.000
Preparatory Depression	0.022	2.595	0.009
Reactive Depression	0.076	9.071	0.000
Acceptance	0.045	5.346	0.000
Awareness	0.153	18.141	0.000

Table 4. Fleiss' Kappa values for Kübler-Ross labels in the clinicians' group

	Fleiss' Kappa	Z-Score	P value
No pain	0.442	30.343	0.000
Denial	0.120	8.236	0.000
Anger	0.136	9.320	0.000
Bargaining	0.041	2.821	0.005
Preparatory Depression	0.019	1.272	0.204
Reactive Depression	0.092	6.312	0.000
Acceptance	0.040	2.718	0.007
Awareness	0.143	9.832	0.000

Table 5. Fleiss' Kappa values for Kübler-Ross labels in the psychologists' group

	Fleiss' Kappa	Z-Score	P value
No pain	0.451	7.995	0.000
Denial	0.246	4.365	0.000
Anger	0.293	5.188	0.000
Bargaining	0.160	2.833	0.005
Preparatory Depression	-0.043	-0.765	0.444
Reactive Depression	0.218	3.862	0.000
Acceptance	0.126	2.236	0.025
Awareness	0.261	4.628	0.000

In Tables 6 and 7, Fleiss' Kappa values for pragmatic labels given by MA students are reported.

Table 6. Fleiss' Kappa values for pragmatic labels (macro-acts)

	Fleiss' Kappa	Z-Score	P value
Assertion	0.488	125.398	0.000
Direction	0.474	121.690	0.000
Expression	0.513	131.662	0.000
Rituals	0.852	218.803	0.000
Dialogic Moves	0.607	155.755	0.000

Table 7. Fleiss' Kappa values for pragmatic labels (micro-acts)

	Fleiss' Kappa	Z-Score	P value
A_clarification	0.245	61.941	0.000
A_description	0.324	81.878	0.000
A_information_giving	0.481	121.717	0.000
A_listing	0.366	92.508	0.000
D_event_presentation	0.322	81.514	0.000
D_recall	0.366	92.741	0.000
E_complain	0.358	90.498	0.000
E_contrast	0.240	60.664	0.000
E_doubt	0.497	125.695	0.000
E_easement	0.359	90.822	0.000
E_softnening	0.414	104.709	0.000
E_wish	0.811	205.126	0.000
R_greetings	0.140	35.445	0.000
R_thanks	0.826	209.139	0.000
DM_question_ repetition + reply	0.457	115.712	0.000
DM_repetition_ request	0.624	157.897	0.000

Upon assessing inter-raters' agreement through Fleiss' Kappa, we also observed the frequency and distribution of each macro- and micro-act through grouped bar charts, using data visualization tools in Orange. This method allowed us to compare and understand the internal linkages among pragmatic labels and their associations with the psycho-emotional aspects of utterances. In Figures 1 and 2, the distribution of macro-linguistic acts in pain and no-pain utterances is reported. It is first interesting to note that pain and no-pain utterances are evenly distributed in the dataset (160 and 156). While items labelled as assertive prevail in both groups, pain utterances show, as expected, a greater presence of the other macro-acts,

especially direction and expression. Dialogic moves are mostly associated with the absence of pain.

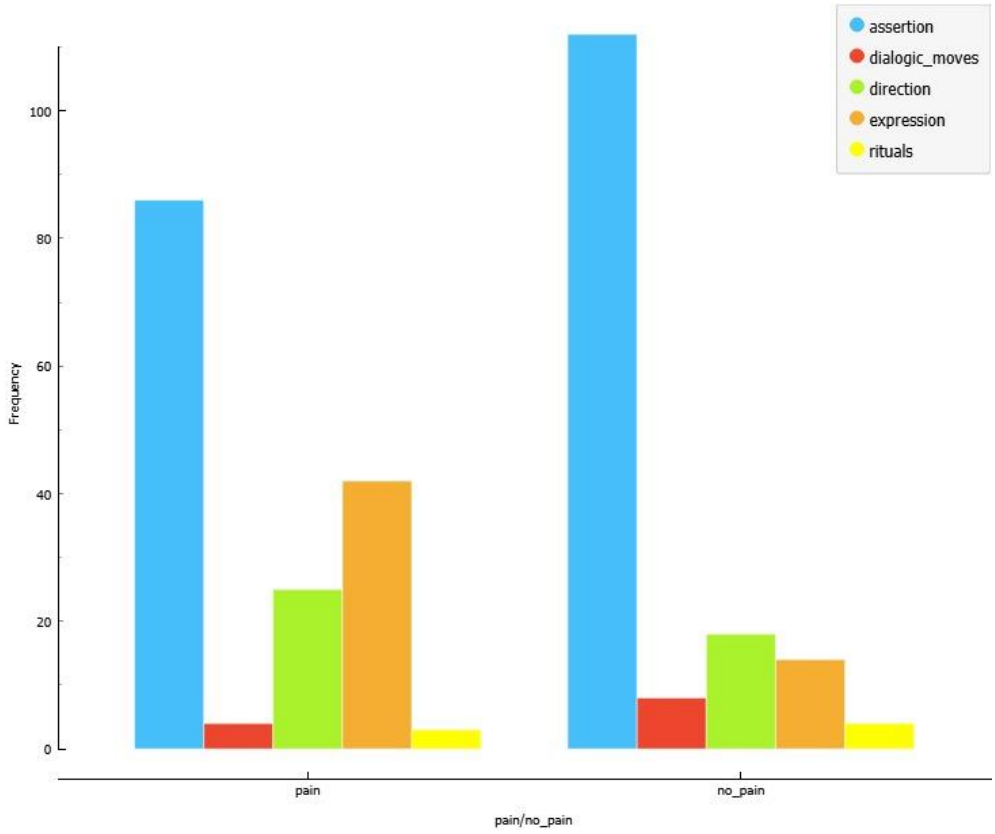

Figure 1. Distribution of pragmatic macro-acts in pain and no-pain utterances

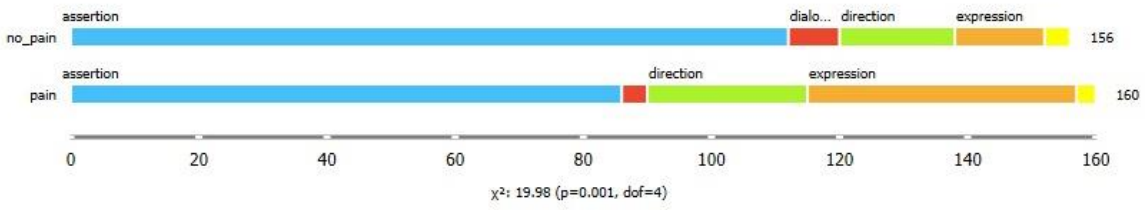

Figure 2. Distribution of pragmatic macro-acts in pain and no-pain utterances (with statistics)

In Figure 3 the distribution of pragmatic micro-acts is reported. The graph makes clear that assertive items have a different connotation in pain-related and non-pain-related utterances: while they are mostly used to describe a situation or state of mind in pain-related utterances, assertion almost exclusively takes on the function of providing information in pain-free

productions. It is also worth noting the greater variety of directive and expressive micro-acts in the pain-related utterance group.

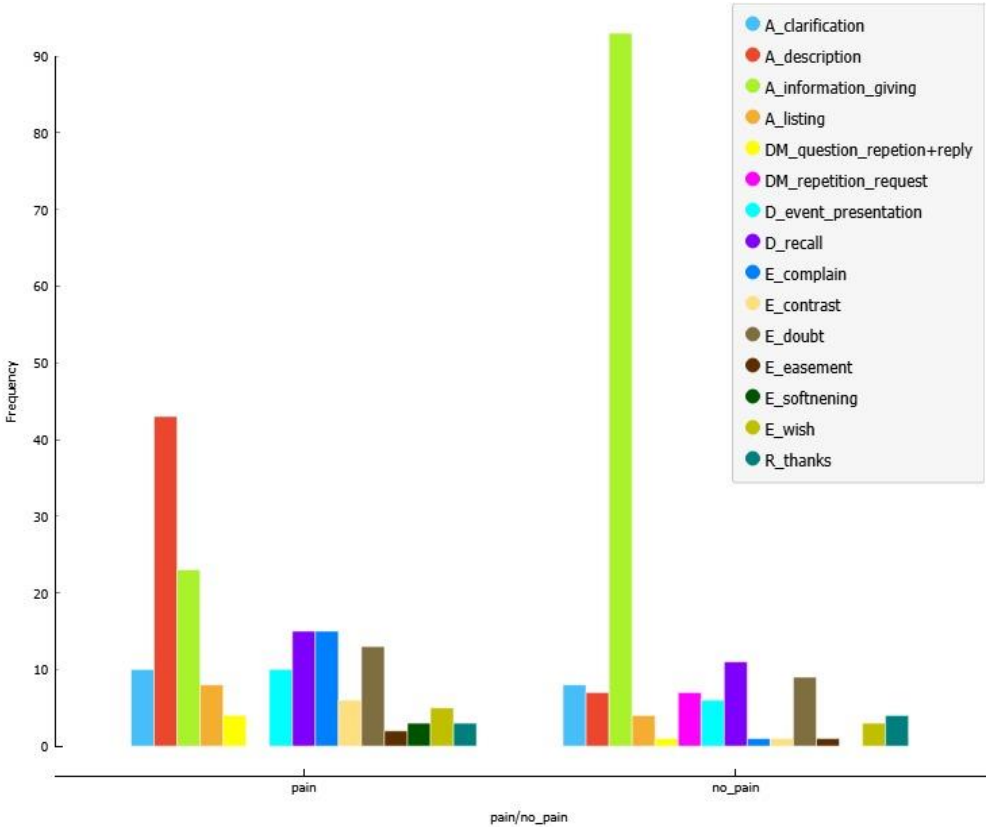

Figure 3. Distribution of pragmatic micro-acts in pain and no-pain utterances

Figure 4 shows the distribution of pragmatic macro-acts in pain-related utterances considered according to the identified Kübler-Ross stages. If awareness is the most used label (77) and includes a high number of assertive utterances, for the other stages of grief the number of expressive utterances grows in proportion, while directions are more present in awareness and anger.

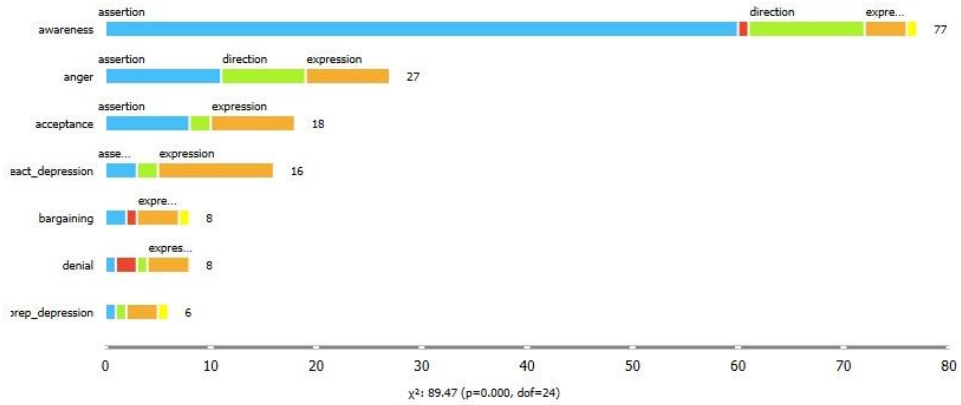

Figure 4. Distribution of pragmatic macro-acts in annotated utterances according to Kübler-Ross stages

4. Discussion

This contribution aimed to present and test a procedure for annotating cancer patients' utterances, collected through a questionnaire, by combining a psycho-emotional model (Kübler-Ross stages of grief) with a complex, pragmatic classification scheme. To achieve this goal, four groups of raters participated in the annotation procedure, which was conducted remotely. Inter-raters' agreement was tested using Fleiss' Kappa.

The Fleiss' Kappa for no-pain utterances, the Kübler-Ross labels, as reported in Table 3, is 0.442, indicating "fair agreement" among raters. The overall value is 0.182, corresponding to "slight agreement". Although not flawless, this outcome indicates a fundamental rationale behind the evaluations, discounting the possibility of arbitrary selection by the evaluators. If we consider evaluators by specialty, psychologists exhibit markedly superior concordance, attaining a "moderate agreement" level, evidenced by a Fleiss' Kappa of 0.451 for the no-pain label, alongside commendable agreement across various categories. The overall value of Fleiss' Kappa for psychologists is 0.421, corresponding to "fair agreement", while for clinicians it is 0.201. This suggests that psychologists may possess heightened sensitivity and training to discern subtle distinctions relative to other experts. Furthermore, it enhances the reliability of the labelling, especially in differentiating between pain-related and non-pain-related scenarios. The agreement in the identification of Kübler-Ross stages of grief is quite low in all the groups.

Conversely, both categories of macro- and micro-pragmatic labels exhibited superior performance. The overall value of Fleiss' Kappa for macro-acts is 0.467 (moderate agreement), while for micro-acts it is 0.384 (fair agreement). Numerous pragmatic labels had "moderate" and "substantial" agreement levels, with some attaining "almost perfect" agreement (i.e., wish = 0.811), signifying exceptional consistency in the evaluations.

Redirecting attention to the visual depiction of the data highlights potential implications closely associated with the theoretical framework.

Although the first graph, in Figure 1, might suggest that the pain and no-pain labels exhibit identical performance, when we observe the micro-act distribution in the Figure 3, no-pain utterances exhibit a predominance of the "information giving" classification, indicating that patients primarily focused on providing succinct responses to the nurses' questions, potentially due to the context of the interviews, which may have been perceived more as a series of questions with limited responses rather than an opportunity for personal expression akin to a typical conversational setting. Conversely, the predominant assertive label in pain-utterances is "description", indicating that patients shared detailed anecdotes regarding their pathology and related life experiences, even offering practical examples from their real-life situations, thereby providing insight into their physical and psychological condition. Admittedly, a certain extent of "providing information" is unavoidable. The notable aspect of the "expressive" labels is the variation in the use of the "complain" label. The patients who provided a detailed narrative of their experience exhibited behaviour consistent with the literature (Kübler-Ross), indicating that their complaints were linked to the second stage of grief: anger. Linguistically, it was interesting to observe the various linguistic tools used in these situations, particularly the mixing of codes (Italian and dialect), topicalization, and metaphors, to which special attention will be paid in the next section. Furthermore, "contrasting" was primarily employed to delineate the changes in the patient's capabilities before and after, highlighting what they could no longer accomplish compared to the past, while offering insights into their quality of life and therapy. As expected, and previously mentioned, it was not surprising that the "expressive" labels experienced an overall rise in usage within pain utterances, whereas some exhibited minimal to no usage in no-pain utterances: the "expression" category more than doubles in pain-related utterances, indicating a statistically significant disparity in the distribution of linguistic acts in the two groups. In other words, the language acts employed by the patient differ while discussing pain compared to non-pain expressions. This corroborates the finding that expressions of personal feelings and emotions are more prevalent in pain contexts, but other speech acts, such as assertions or rituals, might dominate in circumstances free of pain. Finally, Figure 4 illustrates the correlation between Kübler-Ross designations and the category of pragmatic macro-act utilised. Awareness emerged as the predominant category, highlighting the need for standardized assessment surveys on the type of pain, its location, and the treatments patients have received or are receiving. This underscores the essential importance of gathering comprehensive data to comprehend patients' experiences and requirements. Anger was frequently articulated through complaints and accounts of occurrences or dynamics that elicited these emotions. Numerous patients conveyed how their social interactions have been influenced by their illness, providing insight into the significant effects of chronic disorders on personal life. This response illustrates the frustration and tension they experience, which may be expressed towards family members and healthcare personnel as a means of releasing their emotional distress. Acceptance was recognised as a dynamic condition, consistent with Kübler-Ross's grieving model. It became evident that not all patients are at the same stage of acceptance. Some oscillated between various stages of grief even within a single interview,

transitioning from a fleeting state of stability and acceptance to revisiting prior stages of the mourning process. This variety highlights the shifting nature of managing chronic illness. In comparing preparatory depression to reactive depression, the latter was more prevalent, aligning with existing literature (Kruijt et al., 2013). Patients with preparatory depression typically retreat into silence and exclusion, bracing for an imminent loss or life alteration. Conversely, those with reactive depression were more likely to articulate their ideas, anxieties, and frustrations regarding their present circumstances, which accounts for the anticipated prevalence of reactive depression expressions over preparatory ones. The bargaining stage, while evident, did not materialise as robustly as expected. The anticipated use of expressive behaviours, especially the "wish" designation, was diminished. This may be ascribed to the advanced phases of illness experienced by the patients, wherein the awareness of their state may render them less inclined to indulge in wishful thinking or beseech for miraculous cures, even in a metaphysical sense. Denial is the least common designation, often manifested through requests for question repetition or the denial of elements when uncertain about specific circumstances. Several patients indicated experiencing mild confusion throughout the interviews, possibly attributable to the effects of their ongoing medications. Given that all patients were diagnosed with stage 4 cancer, it is uncommon to deny the existence of an illness when symptoms have intensified significantly. It is important to highlight that most patients had received their diagnoses at least one year before the interviews.

4.1 Metaphorical Expressions and Colour Selection

As mentioned in the previous section, metaphorical expressions and pain-color associations were of interest in a more detailed linguistic analysis. We propose now some reflections on them to be expanded upon in subsequent studies.

Metaphors have been employed to convey location, temporal occurrence, intensity, and type of pain. Regarding location, pain has been described in the legs, genitals, throat, back, spine, hands, or even as a singular spot, with the highest prevalence observed in the legs and back. It is referred in other works to pain as a feral beast, capable of infiltrating in particular moments, akin to patient reports indicating that pain exacerbates during episodes of anger or while engaging in routine activities, such as rising or bending, underscoring the detrimental effect of the condition on their quality of life (*quando andavo a urinare, quando sono nervoso si acuisce, ha cambiato la vita e il modo di fare le cose* (English: when I went to urinate, when I am nervous it becomes harder, it has changed my life and the way I do things). In discussing severity, chronic patients emphasise the persistence of pain rather than its intensity (*leggero ma fastidioso* (English: light but annoying), whereas other patients exclusively described brief periods of highly intense pain experiences. (*avevo delle fitte […] che strillavo* English: I had pangs that made me scream). The reports concerning the type of pain exhibited a certain degree of creativity, although they also reflected tendencies that depended on cultural identity. Primarily, several patients indicated an inability to articulate their suffering, asserting that the interviewer would find it impossible to comprehend or empathise with their experiences, or that the complexity of their pain rendered them unable to verbal expression. (*non riuscirei a descriverlo bene, non potrebbe capire* (English: I couldn't describe it well, you couldn't understand). Furthermore, when the interviewer could relate to what the patients

were feeling, it required drawing from their life experience (*internamente come la bruciatura, quando uno si fanno scottature esternamente* (English: internally like burning, when one gets burns externally), hence it implied knowing what it feels like when you burn yourself and feel an internal burning sensation, presuming that it is a nearly universal experience that everyone has encountered at least once throughout their lives. Thus, it implied an understanding of the sense of self-inflicted burns and the accompanying interior heat, presuming that it is a nearly universal experience that everyone has encountered at least once throughout their lives. Additionally, the presence of blunt and sharp tools, including sledgehammers, knives, and hammers, has been noted by others. The recurrence of symptoms such as stabbing, sharp pain, burning sensation, hammering sensation, throat tightness, pressure, and dizziness indicates that certain elements may not be culturally dependent but rather pain-dependent, suggesting they are common across a broad global population, irrespective of cultural background. Regarding colours, we have a singular occurrence of purple, yellow, and pink; however, other colours exhibited a greater frequency: black appeared six times and red three times. Participants indicated that the last two colours were linked to a heightened intensity of pain sensation, correlating with idioms such as *la situazione è nera* (English: the situation is black – very bad) and the association of the colour red with fire, particularly when a burning sensation was notably distressing for the patient. A minority of patients did not see a rationale for their colour, suggesting their decision stemmed from random selection rather than cognitive association.

4.2 Constrains and Challenges

The principal constraints of our methodology encompass the difficulty in acquiring adequate data (Mojab et al., 2020), as robust datasets are essential for a comprehensive evaluation of the system's validity. Future research must prioritise the collection of more targeted and extensive datasets to address this limitation and enhance the precision and dependability of the results. In response to this challenge, recent developments have introduced tools, such as data visualisation dashboards (Cutugno & Cascella, 2024), which possess the potential to enhance the efficiency and scalability of pain assessment, in turn supporting richer and more objective datasets over time. New video interviews should be extended and meticulously tailored to better correspond with the study's aims. The potential for generating synthetic data may be investigated in the future (Cohen et al., 2021). Moreover, engaging a larger group of trained annotators from psychology and linguistics is essential for executing a comprehensive statistical analysis of the annotation scheme. Furthermore, manual tagging might be exceedingly time-consuming. Moreover, comparisons with clinical metrics, like pain measures and psychometric assessments, are crucial (Nagendran et al., 2020). Such comparisons would facilitate a more thorough evaluation of the scheme's accuracy and overall effectiveness.

5. Conclusions

This research offers a unique interdisciplinary contribution by operationalising grief theory and pragmatics within clinical pain assessment. Unlike previous studies, which focus largely on facial expressions or numerical self-reports, our work brings spoken language to the

foreground as a rich, underutilized resource in understanding pain experiences. By combining a modified Kübler-Ross framework with a two-level pragmatic annotation system, the study identifies meaningful correlations between emotional stages and specific linguistic patterns. The resulting framework demonstrated moderate inter-rater reliability (higher for the pragmatic annotation and in the group of psychologists for the psycho-emotional labels) and can inform future AI-based pain recognition systems, improving their sensitivity to the psycho-emotional dimensions of patient communication. Importantly, our observations also highlighted the widespread use of metaphorical expressions to describe pain, linking sensations to tools, colours, or embodied experiences, which suggests that metaphors are not just stylistic choices but essential cognitive and communicative strategies for making suffering comprehensible to oneself and others. Our methodology integrates balanced clinical sampling, validated transcription tools, and transparent annotation criteria. Moreover, communicative context is also a crucial element that shapes pain expression. In doing so, this research fills a critical gap in both clinical pain evaluation and linguistic pragmatics by offering a replicable, language-based framework for pain assessment, one that bridges the patient's subjective experience and objective analysis. Nevertheless, some concerns remain. The relatively small and culturally homogenous dataset may limit the generalizability of results, and manual annotation remains time-intensive. Future research should prioritize expanding the dataset across different languages and cultural contexts, maybe even contemplating the generation of synthetic data. In conclusion, this study not only complements but extends existing approaches, setting a benchmark for future interdisciplinary research and the integration of AI in healthcare communication.

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