Guidelines for Aspect-Based Sentiment Analysis for Patient Feedback

LTG (UiO) and NIPH, 2024

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1 Introduction

While basic sentiment analysis datasets aim to identify the polarities (positive, negative) of a given text, paragraph or sentence, this does not automatically allow us to extract what these polarities are targeted at. Even with targets, i.e. the entity the polarities are targeted towards, are annotated, we are not necessarily able to infer the correct categories. Aspect Based Sentiment Analysis (ABSA) aims to solve this by investigating the overarching categories in texts containing polarity. By annotating aspects, we are able to infer much more detailed information from the data we are working on.

ABSA was part of the SemEval shared task during three consecutive years in 2014-2016. [1]. There is no earlier work on Norwegian ABSA.

2 Aspects

Our aspect categories are defined based on the needs of the Norwegian Institute of Public Health (NIPH). We define two sets of aspect categories, one for each category of patient feedback. Aspect categories are primarily provided at the domain level (SMH, GP), but some general categories are common to both. We will here present categories for each of the two main domains, followed by an overview of general categories. See the end of the document for summaries of both categories, with common aspect categories marked.

In order to make the annotation more effective, and to provide the possibility of cross-domain (SMH, GP) training, several aspects have slightly different interpretations in the two domains, but are common to both. Aspect descriptions are given separately for the two categories.

3 GP Aspects

These are the aspects for the general practitioners part of the dataset.

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[1] https://alt.qcri.org/semeval2014/task4/
http://alt.qcri.org/semeval2015/task12/
http://alt.qcri.org/semeval2016/task5/

3.1 Treatment

3.1.1 Medication – MED *(Common category)*

The patients commonly mention satisfaction and dissatisfaction regarding their medication, including medication errors, and patients may feel that medication takes away from other ways of treatment. Keywords include less medication, good medication, medication error and too much focus on medication. Wrong medication.

3.1.2 Stability and continuity in treatment – SCT *(Common category)*

This aspect describes seeing the same GP over time as well as the comments regarding substitute doctors, other doctors, and remarks on the main GP's absence. In addition, it covers comments regarding continuity or lack of it, poor follow up or delayed treatment; that the GP recognize the patient and knows their medical history. A patient might have had a certain GP for many years, or they might lack their own GP and have had many substitution doctors. Comments on change of GP and GP retirement also belong here. Keywords include short-term, new and unfamiliar, substitute, no doctor, knows me. lack of continuity, poor follow-up of treatment plans and delayed treatment.

3.2 Healthcare providers and staff

3.2.1 Patient – provider/staff relationships – PPR *(Common category)*

This aspect describes the feeling of being seen, being taken seriously, and whether the GP cares or gives the impression of caring. Different types of positive and negative behaviour reflecting the GP's relation to the patient is included here, such as looking at the PC or not caring in general.

3.2.2 Competence of Providers – CP *(Common category)*

This aspect describes the perceived competence and skill of the GP in relevant fields. As this is from the patient's perspective, notions of professional trustworthiness are also included in this aspect, and some keywords normally indicating positive polarity for this aspect include safe, trustworthy, knowledgeable, while some negative include lack of knowledge, wrong diagnosis, uncertainty.

3.2.3 Time Spent with healthcare Professionals and consultation length – TSHP *(Common category)*

Time during consultation with the GP. This aspect also covers the patient's perception of the doctor's relation to time: Whether the GP seems stressed or not. For instance, the GP might ask the patients to book another consultation if the patient has more problems to discuss.

3.2.4 Information sharing with patients – ISP *(Common category)*

The health professional's ability to communicate and give information. This is communication and information with the GP– and which the doctor can have an impact on.

3.3 Access and availability

3.3.1 Waiting Times in Clinic – WTC

The aspect describes the waiting time which the GP can have an impact on. Waiting time in the waiting room.

3.3.2 Waiting time for appointment – WTP

Comments and sentences related to time required to book an appointment with the GP.

3.3.3 Telephone and digital communication – TD

This aspect covers the time it takes or difficult to get in touch with the doctor's office by phone and all digital communication with the GP office including lab/test results, booking appointments online and physically, ordering repeat prescriptions online, accessing my medical records online, video consultations.

3.3.4 Geographical distance to GP office – GD

This aspect covers the geographical distance to GP office and describes comments on difficulty of getting to the GP caused by geographical distance.

3.3.5 Workload – WOL

This aspect describes that the GPs or others in the GP office are overloaded with work, do not have time, and this is obvious for the patients.

3.4 Organization of health services

3.4.1 Structure and routines – SR *(Common category)*

The patient's experience with the organization of the office and the GP service overall, routines, scheduling, the reception, the waiting area, parking and availability, payment methods.

3.4.2 Internal Cooperation and Communication – INCC *(Common category)*

Communication between GP and other personal, protection of confidentiality.

3.4.3 External Cooperation with Other Services – EXCOS *(Common category)*

Whether the doctor correctly registers referrals, refer when needed and communicates with other services.

3.4.4 System-level organization of health services and capacity – SLOHS *(Common category)*

Addresses patient perspectives on the overall structure and systemic organization of GP services within inpatient care. It encompasses general reflections on the accessibility, coordination, and strategic organization of services as a whole, rather than specific operational elements.

3.5 Environment and facilities

3.5.1 Physical and psychosocial environment – PPE *(Common category)*

This aspect describes the standard of the office and waiting room.

3.6 General

3.6.1 General – GEN (*Common category*)

This aspect is used in cases where a patient's utterance clearly indicates positive and/or negative sentiment, but where the content is too general to be pin-pointed to one of the other aspects. For instance, this applies to the sentence "jeg er fornøyd med fastlegen min.", 'I am satisfied with my GP.'. Overall, this aspect indicates general satisfaction or dissatisfaction.

3.7 Missing aspects

During the initial annotation runs, or even after, annotators can choose to mark sentences for aspects that have not been defined.

3.7.1 Other – OTH (*Common category*)

This label is used for interesting, but undefined aspects that should be picked up. Ideally these are then discussed, so that a proper label can be defined. Aspects that are not interesting, or that are irrelevant to the task, are not annotated with the OTH-label. The annotators can attach a comment to the OTH label, like this: OTH-sheets, OTH-specialists. E.g., if errors in treatment do not fit under the MED or CP category, it can be attached to the OTH-label – OTH-error. Cases regarding language or hygiene are also attached to the OTH-label, e.g. OTH-språk or OTH-hyg.

4 SMH Aspects

This is an overview of special mental healthcare aspects.

4.1 Treatment

4.1.1 Medication – MED (*Common category*)

The patients commonly mention satisfaction and dissatisfaction regarding their medication, including medication errors, and patients may feel that medication takes away from other ways of treatment. Keywords include less medication, good medication, medication error and too much focus on medication. Wrong medication.

4.1.2 Stability and continuity in treatment – SCT (*Common category*)

This aspect describes how the patient experiences continuity in their treatment, addressing contact persons and other health providers. The comments describe lack of continuity during treatment, delay in initial treatment and insufficient follow up of treatment plans. Keywords include lack of continuity/predictability, change of personnel, poor follow-up of treatment plans and delayed treatment.

4.1.3 Forced treatment/coercion – FTC

This aspect describes the use of force by employees. Keywords include unnecessary use of force, restraint belt, forced medication.

4.2   Healthcare providers and staff

4.2.1   Patient – provider/staff relationships – PPR *(Common category)*

This aspect describes properties of the employees that create a sense of safety and trust with the patients. Keywords include safety, trust, being seen, uninterested employees, lack of care. It also refers to the patients' experiences with how the employees relate to them. For example, how accommodating or welcoming they are, but also if the patients perceive the employees as stressed or lacking interest in the patient's needs. Keywords include attitudes, welcoming, warm, professional, stressed, derogatory, lacking interest.

4.2.2   Competence of Providers – CP *(Common category)*

This aspect describes the patient's need for specific competence in their treatment providers. In addition to specific competence, the providers should follow an individual treatment plan. Keywords include more competence, specific competence and lack of knowledge/skill, as well as notions of professional trustworthiness related to the provider's professional skills.

4.2.3   Time Spent with healthcare Professionals – TSHP *(Common category)*

Patients often experience that employees do not have enough time for conversation, which in turn leads to feelings of insecurity or of being ignored. Keywords include too little time, lack of oversight, ignored, safety, trust, being seen, uninterested employees, lack of care.

4.2.4   Information Sharing with Patients – ISP *(Common category)*

The health professional's ability to communicate and give information. This is communication and information with the health professional, and which the proffessional can have an impact on.

4.3   Patient involvement and participation

4.3.1   Patient involvement and participation – PIP

This aspect describes the extent to which patients feel involved and heard in their care. It includes shared decision-making, active participation in treatment planning, and feeling that their input is valued by staff. Positive comments reflect empowerment and a voice in their care, while negative feedback may point to feeling overlooked or lacking influence in decisions.

4.4   Outcomes and impact of treatment/stay

4.4.1   Outcome and impact of treatment/stay – OITS

This aspect describes patients' perceptions of the overall effectiveness and impact of their treatment or inpatient stay, encompassing both treatment outcomes and the broader experience. It includes reflections on personal progress, and whether the stay met their expectations for recovery and wellbeing. Positive feedback highlights improvements and a sense of progress, while concerns may include a lack of improvement, unmet expectations, or feeling unprepared for life after discharge. It may also include the opinion of having received the wrong type of treatment.

4.5 Organization of health services

4.5.1 Duration of Treatment and Stays – DUR

This aspect describes the perceptions of the patient's stay. Patients might indicate that their stay is too short and may indicate that this causes stress and worry for premature discharge. Keywords include too short stay, premature discharge.

4.5.2 Structure and routines – SR *(Common category)*

Sentences containing experiences with structure and routines. The patient might express a wish for more flexibility and fair regulations. Keywords include structure, routines, strict rules, unpredictability, lack of flexibility.

4.5.3 Internal Cooperation and Communication – INCC *(Common category)*

This aspect describes the patient's experiences with intern communication and cooperation and collaboration internally in the institution. Common themes might include communication between employees and patients.

4.5.4 External Cooperation with Other Services – EXCOS *(Common category)*

This aspect describes how the employees cooperate/ collaborate with other services, such as the local government and other treatment facilities. Keywords include good cooperation, cooperation with family, cooperation with the local government.

4.5.5 System-level organization and capacity – SLOHS *(Common category)*

Addresses patient perspectives on the overall structure and systemic organization of mental health services within inpatient care. It encompasses general reflections on the accessibility, coordination, and strategic organization of services as a whole, rather than specific operational elements.

4.6 Environment and facilities

4.6.1 Physical and psychosocial environment – PPE *(Common category)*

This aspect describes the general standard of rooms, buildings and the environment in general, and also with the psychosocial environment, and feelings of being safe. Keywords include Safe environment, good/bad standard, noise.

4.6.2 Activities – ACT

Patients might express a wish to be part of more accommodating physical and social activities. Positive experiences typically reflect existing offers, while negative tend to focus on the lack of relevant options. Keywords include more activities, more physical activity, great trips, organized activities.

4.6.3 Quality of food and meal routines – QFM

Food quality and dining routines are important aspects for many patients. Patients might comment on lack of variation and better facilitation to suit the patient's needs. Key terms include poor quality, lack of variation, too much bread and milk, better food, flexible mealtimes.

4.6.4 Interaction with other patients – IOP

This aspect describes the patient views opportunities or cases of interaction with other patients. Some patients might positively regard social training with other patients, while others may feel insecure in the absence of any employees. Keywords include good social training, safe environment, insecurity, lack of supervision.

4.7 General

4.7.1 General – GEN *(Common category)*

This aspect is used in cases where a patient's utterance clearly indicates positive and/or negative sentiment, but where the content is too general to be pin-pointed to one of the other aspects. For instance, this applies to the sentence "Alt er bra.", 'All is good'. Overall, this aspect indicates general satisfaction or dissatisfaction.

4.8 Missing aspects

During the initial annotation runs, or even after, annotators can choose to mark sentences for aspects that have not been defined.

4.8.1 Other – OTH *(Common category)*

This label is used for interesting, but undefined aspects that should be picked up. Ideally these are then discussed, so that a proper label can be defined. Aspects that are not interesting, or that are irrelevant to the task, are not annotated with the OTH-label. The annotators can attach a comment to the OTH label, like this: OTH-sheets, OTH-specialists. E.g., if errors in treatment do not fit under the MED or OITS category, it can be attached to the OTH-label – OTH-error. Cases regarding language or hygiene are also attached to the OTH-label, e.g. OTH-språk or OTH-hyg.

5 Aspect assignment and polarity

The goal of this round of annotations is twofold. First of all, we want to identify aspects in a given sentence, based on a set of pre-defined aspect categories. Having identified a set of aspects, we want to associate each aspect category with a polarity, either positive or negative. This is a slight reduction in complexity compared to the earlier work done on sentiment, where intensity was included in the annotations. In other words, the task of this annotation effort is to identify aspects in a sentence, and then tie them to the existing polarity annotations.

5.1 Adding labels after initial annotations

The most important things to consider when defining aspects is that they are well-defined and easy to separate. If the annotators feel that a more fine-grained category should be annotated, it is possible to (in a later revision of the guidelines) add a third level, for example indicated by hyphens. For example, if the theoretical ANS refers to employees (ansatte), then we could add ANS-lege, ANS-sykepleier, ANS-psykolog, etc. However, doing this at a very fine level becomes tedious, and starts getting close to doing targeted or fine-grained SA. It should only be used when the more fine-grained division is useful and meaningful for later work.

ID	Text	P	N	P-asps.	N-asps.	PolChange
166-0	Har stor tillit til alle på legekontoret .	ss	b	PPR	b	no
166-1	De har alle god kompetanse og god tid .	ss	b	PPR, TSHP	b	no

Table 1: Example of how annotation can look like. The P and N columns contain the existing annotations, while the P-asps and N-asps are the columns where the aspect level annotations are done. If there are no annotations, "b" is filled in each column that this applies to – also if there are no annotations.

5.2   Changes in Polarity

The polarity associated with the aspects should be based on earlier annotations, but if the annotator notices an erroneous earlier polarity assignment, they are able to change it, but this must be indicated in the corrections column. One notable change compared to the polarity annotation is that we do not mark polarity intensity at the aspect level.

5.3   Annotation setup

The aspect annotations are based on earlier sentence and comment level sentiment annotations, but we reduce the complexity of the polar annotations. For each sentence, a selection of aspect categories can be chosen. Initially, we experiment with two different setups, but only one of them will be chosen. Below are some examples of more specific problems. See 1 for an example of how this can look like.

5.3.1   Polarity in the Setup

In the annotation setup, there is one column for positive aspects, and one for negative, similar to what was done for SA-annotation, where abbreviations of relevant aspect categories are filled into the relevant columns. This leads to fewer steps. An abbreviated code for a certain low-level aspect class is written in the corresponding column. Note that intensity is not indicated.

The polarity from the earlier annotations are already indicated. The annotator then needs to add aspect category labels into the correct column. Polarity should reflect earlier annotations. If the annotator feels that the polarity indicated earlier does not fit, then this should be marked in a third column.

5.3.2   Summary of Polarity Annotation

We summarize the core principles of polarity annotation, especially in order to understand the annotations that carry over from before. Please refer to the SA guidelines for a full overview.

We use the letter s to indicate intensity:

- s – slight

- ss – standard

- sss – strong

Annotation is done in two columns, with one column for positive sentiment and one for negative sentiment. It is the placement in the columns that decides whether the intensities are interpreted as positive or negative.

Other labels   Some other labels were used in the earlier annotation rounds. These were:

- k: comparative (nor. komparativ) – Indicating that a comparative expression (than, better, etc.) is used. Comparatives provide an additional challenge for SA systems.

- i: irrelevant – Indicating that the aspect of the target of the polar expression refers to something that is not relevant to the survey in question. For example, if a patient describes a hospitalization when reviewing the GP. These are examples of a kind of early aspect-based annotations, and an i indicates that at least one polar expression in the sentence refers to something that is seen as an irrelevant aspect. These should not contain relevant aspects, as that would have overridden the i annotation, but be sure to check this.

- q: questionnaire – Another example of a kind of early aspect-based annotation, as it indicates that the sentence is about the questionnaire itself. As with i, these should not contain relevant information for the aspect-based annotation.

Positive and Negative   sentiment is indicated by positive or negative attitudes towards some part of the sentence. It can be a direct expression of the patient's feelings (I think, I feel), or it can be implicitly in some evaluation (good, tasty, friendly, bad). More indirect expressions can also be used. A useful trick is to think along the lines of *Are there any words in this sentence that makes me understand how the patient feels/thinks about something?*

5.4   Annotating Aspects

But note that as earlier polarity indications only has a single score for each sentence, there could be differences in the intensity. This means that although intensity is not annotated, the annotator does not need to agree on intensity, and a single polarity score for a sentence might be the average of several polar expressions. Disagreement in polarity should only be in cases where there is opposite polarity, or an absence of polarity.

For example, a sentence might look like in example 1. This sentence would be annotated sss in the polarity column, indicating strong positive polarity, but there is also a weak (*not too bad*) polarity, which is not taken into account when assigning the sentence level polarity. The two polar expressions belong to different aspects, and would originally have different intensities, but since we do not annotate intensity at the aspect level, these are both simply annotated as positive.

(1)   *Jeg   er   veldig   fornøyd   med   forholdet   mitt   til   fastlegen,   og*
     I   am   very   pleased   with   relationship.the   my   to   gp.the,   and
    ventetiden   er   helt   ok.
    waiting.time.the   is   completely   ok.
    'I'm very pleased with my relationship to the GP, and the waiting time is not too bad.'

Aspect marking of irrelevant polarities   In some cases, a polarity might have an i with it, giving the combinations *si, ssi* and *sssi*. These were deemed as irrelevant to the overarching themes (GP, SMH) in the earlier annotation. However, if the annotators feel that these should be marked for aspect, they can do so, either by simply providing the appropriate aspect label, or by using the

OTH-label. In the semi-made up sentence below, given the earlier polarity annotation POS:ssi and NEG:ss.

(2) *Jeg   er   ikke   så   fornøyd   med   **legen***   *,   men   føler   jeg   får   god   hjelp   av*
     I   am   not   so   pleased   with   doctor.the   ,   but   feel   I   get   good   help   of
     spesialistene på sykehuset   .
     specialists.the   at   hospital.the   .
     'I'm not so pleased with my GP, but I feel that I get good help from the hospital specialists.'

Positive and Negative polarity in the same sentence.   In the above example, we have two different polarities in the same sentences. Let us look at another sentence with two polarities. In this example, annotated as POS:ss, NEG:sss, we again have two targets, in bold. Generally, assigning aspect is an implicit target-identifying exercise, but if there are multiple conflicting polarities in a sentence, this becomes clearer, compared to when there is only one. If a sentence only contains one polarity, then, given that the annotation is correct, all aspects in that sentence should have the same polarity. However, when we have conflicting polarities, we have to identify which polarity belongs to which aspects. This can be done by first locating which expressions give the various polarities, and then which targets they modify, and then seeing which aspect categori(es) the targets belong to.

(3) *Jeg   er   glad   for   **at jeg kom**   ,   men   er   redd   for   å   dra   hjem   ,   jeg*
     I   am   happy   for   that   I   came   ,   but   am   afraid   for   to   go   home
     *føler   ikke   **det**   blir   tatt   seriøst   .*
     ,   I   feel   not   it   is   taken   seriously.
     'I'm happy that I came, but I am afraid of going home; I don't feel that that's being taken seriously.'

Here, we see that the core positive indicator for POS:ss is "glad for", which modifies "at jeg kom". This means that the positive aspects should be related to this polar expression and target.

For the negative annotation, we see that the expression "føler ikke [...] blir tatt seriøst" modifies "det", which again refers back to "redd for å dra hjem". Since there is a passive construction, some disambiguation must be done to understand who it actually is that do not take the patient seriously, but then the aspect can be marked accordingly.

These kinds of disambiguations must be made when there are multiple polarities, but remember that since there are only one POS and one NEG annotation per sentence, that does not mean that there is only one aspect. There can be multiple aspects with only one polarity annotation. Since we do not distinguish between intensity when annotating aspects, it does not matter whether the different aspects have different degrees of the same polarity, i.e. we do not distinguish between a POS:s and a POS:sss aspect.

Context usage   Direct usage of context should be used in cases where the aspect of a sentence is ambiguous, but cleared up by one of the surrounding sentences within the comment. It should not, however, be used to assign an aspect that is not actually present in a sentence. For instance, in the sentence "Jeg elsker fastlegen min", 'I like my GP', is annotated with "general", since the underlying aspect cannot be determined by such a general statement. This applies even if the surrounding context implies the reason for why the patient likes the GP, e.g. "Han lytter til meg.", 'He listens to me'. This is the *reason* behind the patient's opinion, but not the *aspect* of the sentence in question. It is, however, the aspect of the subsequent sentence, and the latter can therefore be annotated with the "patient – provider/staff relationships" aspect.

6 Summary of aspects and their label abbreviations – GP

Aspects shared between both GP and SMH are indented and marked in *italics*.

Title	Abbreviation
Treatment	—
Medication	**MED**
Stability and continuity in treatment	**SCT**
Healthcare providers and staff	—
Patient – provider/staff relationships	**PPR**
Competence of Providers	**CP**
Time Spent with healthcare Professionals	**TSHP**
Information Sharing with Patients	**ISP**
Access and availability	—
Waiting Times in Clinic	**WTC**
Waiting time for appointment	**WTP**
Telephone and digital communication	**TD**
Geographical distance to GP office	**GD**
Workload	**WOL**
Organization of health services	—
Structure and routines	**SR**
Internal Cooperation and Communication	**INCC**
External Cooperation with Other Services	**EXCOS**
System-level organization of health services	**SLOHS**
Environment and facilities	—
Physical and psychosocial environment	**PPE**
General	—
General	**GEN**
Missing aspects	—
Other	**OTH**

7 Summary of aspects and their label abbreviations – SMH

Aspects shared between both GP and SMH are indented and marked in *italics*.

Title	Abbreviation
Treatment	—
Medication	**MED**
Stability and continuity in treatment	**SCT**
Forced treatment/coercion	**FTC**
Healthcare providers and staff	—
Patient – provider/staff relationships	**PPR**
Competence of Providers	**CP**
Time Spent with healthcare Professionals	**TSHP**
Information Sharing with Patients	**ISP**
Patient involvement and participation	—
Patient involvement and participation	**PIP**
Outcomes and impact of treatment/stay	—
Outcome and impact of treatment/stay	**OITS**
Organization of health services	—
Duration of Treatment and Stays	**DUR**
Structure and routines	**SR**
Internal Cooperation and Communication	**INCC**
External Cooperation with Other Services	**EXCOS**
System-level organization of health services	**SLOHS**
Environment and facilities	—
Physical and psychosocial environment	**PPE**
Activities	**ACT**
Quality of food and meal routines	**QFM**
Interaction with other patients	**IOP**
General	—
General	**GEN**
Missing aspects	—
Other	**OTH**