

Question Focus and Question Type Annotation in Short Consumer Health Questions:

Objective: annotate full question frames needed to answer all aspects of the questions in the short requests extracted from MedlinePlus query logs. **Note:** a request can contain multiple questions.

A frame is the basic semantic unit representing a set of entities and their relations in a question. A frame is made of a set of slot and value pairs. We can envision the slots labeled with thematic roles and the entities we annotate in the questions as values to be paired with the slots. A chapter on semantic role labeling: <https://web.stanford.edu/~jurafsky/slp3/22.pdf> Also see <https://www.cs.rochester.edu/~gildea/gildea-cl02.pdf>

What to annotate:

Annotate only questions about **health-related information needs** pertaining to Problems, Interventions (Drugs, Procedures, Life-Style) or OrganismFunctions and questions about cost. In all other questions that are out of scope for this annotation, mark the first word in the question as a **NotAnswerable** entity.

NotAnswerable questions include: where a drug can be purchased, insurance information, information about a physician, etc. (e.g., *'Where to buy aspirin?'*) Example of an out of scope question: *'When to go to emergency room'*

In requests that do not look like questions (e.g., *'check how well ...'*), mark the first word in the question as **NotQuestion** entity.

Annotate near-duplicates with the Duplicate entity (the first word). Add the id of the first question that the question is near-duplicate of as an AnnotatorNote.

Some requests do not contain well-formed questions, and for question answering, they may need to be rewritten. An example is *'dosage of nyquil syrup for a 9 years child?'*, which can be rewritten as *'What is the dosage of Nyquil syrup for a 9-year-old child?'* Annotate the first word in such questions with NEED_REWRITE entity. Do not rewrite the question, but annotate the frame elements that are available in the question. Use this flag on all questions that will be clearer and/or well-formed if rewritten.

Note: Even the short requests might contain more than one question. Each question should be annotated with its own frame. Entities annotated in the request can play different roles in different frames.

Example: [I am looking for research on IBS and the link to PTSD.](#)

This request contains two questions: "I am looking for research on IBS" and "Is there a link between IBS and PTSD." Annotate two frames:

Frame 1	Frame 2
Question Type: Information (indicated by looking for) Theme: IBS ResearchCue: research	Question Type: Association (indicated by link) Theme: IBS Theme: PTSD

Frame Elements

The following semantic elements should be annotated in question frames:

Theme (Question Focus): Theme is traditionally defined as the entity most directly affected by an event. In our case, it is the concept that the question is about. Use any of the entity types, e.g., Problem, to annotate focus. At least one focus annotation is **required**. Multiple focuses are possible in questions about relations between entities.

Example: I'd like to learn more about megalocytic interstitial nephritis with malakoplakia.

Always annotate the minimal span needed to understand the question, e.g., if the question is about drug overdose, include the dose taken, but if the question is about drug interactions or comparisons, annotate only drug names.

Optional semantic elements form these slots that are usually filled by entities:

Agent: performs the action involving the theme. In the clinical domain, inanimate objects, such as drugs, procedures and devices could be agents. The agent is often the subject of the verb.

Locative: where the action occurs, in our case, primarily the body parts affected by the action.

Purpose: the reason for which an action is performed.

Patient: we are using this term in its medical sense – what are the characteristics of the experiencer of the action. We could use Experiencer.

Restrictor: indicates the context in which the action occurs

Temporal: the time at which the action occurs or the duration of the action

ResearchCue if the person asking the question is interested in information that goes beyond consumer health information. For example, in *'What is the latest research on Parkinson disease treatment?'* annotate the research indicator "latest research".

Question Types: traditionally, what kind of question is that? In our case, what health related activity/task pertaining to the question focus[es] is of interest? Question types are often indicated by predicates. The question type also outlines the answer type, e.g., if the question type is treatment, the answer types will be medications and procedures. Question type might not be present in information requests, but it is required in all other cases.

Annotate the word or the shortest phrase that indicates the question type (trigger). For example, in *'I would like to ask if I can take glutathione supplement'*, the trigger is *'take'*.

If the trigger involves a conjunction (e.g., *reduce or remove, center or organization*) and both conjuncts are equally valid as triggers, annotate the phrase that contains both.

Question types with examples.

ACTION

Concerned with how a drug/substance acts, a procedure/device works, etc.

how does it help your body ascorbic acid

Frame:

Question Type trigger: help

Theme: ascorbic acid

ALTERNATIVE

Concerned with alternatives for a named entity.

Is there an efficacious alternative to allopurinol?

Frame:

Question Type trigger: alternative

Theme: allopurinol

ASSOCIATION

Concerned with the underspecified relations between two or more named entities. For example, for diseases, these include questions that are not explicitly asking about complication or symptoms. These questions have multiple focus elements.

Can tuberous sclerosis affect eye closure?

Frame:

Question Type trigger: affect

Theme: tuberous sclerosis

Theme: eye closure

CAUSE

Identifies questions asking about the cause of a phenomenon.

Are there any exogenous (outside) factors that cause Batten disease?

Frame:

Question Type trigger: cause

Theme: Batten disease

What are the reasons for Hypoglycemia in newborns

Frame:

Question Type trigger: reasons

Theme: Hypoglycemia

Patient: newborns

COMPARISON	<p>Concerned with comparison of <u>several entities</u>, which should be normally of the same or related types (i.e., comparison of treatments, comparison of diseases, etc.)</p> <p><i>Are there any comparison of the outcomes of acupuncture for tennis elbow compared to massage and ultrasound?</i></p> <p>Frame: Question Type trigger: <i>comparison</i> Theme: acupuncture Theme: massage Theme: ultrasound Purpose: tennis elbow</p>
COMPLICATION	<p>Concerned with complications of a disease or with consequences of a procedure/device or a drug/supplement.</p> <p><i>Does any damage occur from these spells</i></p> <p>Frame: Question Type trigger: <i>damage</i> Theme: spells</p> <p><i>Will swallowing clotrimazole 10mg lozenge hurt me?</i></p> <p>Frame: Question Type trigger: <i>hurt</i> Theme: clotrimazole 10mg</p> <p>Note: dosage is usually important for complication questions</p>
CONTRAINDICATION	<p>Concerned with the conditions in which a drug/procedure or device should not be used because it may be harmful to the person.</p> <p><i>which is not a reason for delivery of ionizing radiation?</i></p> <p>Frame: Question Type trigger: <i>not a reason</i> Theme: ionizing radiation</p> <p>Note: Some questions are ambiguous and can be interpreted as <i>indications</i>, <i>contraindications</i> or <i>association</i>.</p> <p>Example, “<i>can you azrrythromycin if you have supra ventricular tachycardia</i>” Interpret such questions as contraindications: Is <i>azrrythromycin</i> contraindicated in patients with <i>supra ventricular tachycardia</i>? Mark as NEED_REWRITE</p> <p>Frame: Question Type trigger: <i>can</i> – note a verb is missing in this question, annotate the question cue or other indicator in such cases Restrictor: <i>supra ventricular tachycardia</i></p>

	Theme: azrrythromycin
	<p>Concerned with the pricing of a procedure/device/drug or a treatment/management of a particular disease.</p> <p><i>I need to know the cost of extracorporeal shock treatment.</i></p>
COST	<p>Frame:</p> <p>Question Type trigger: cost</p> <p>Theme: <i>extracorporeal shock treatment</i></p>
	<p>Questions that list symptoms and ask for diagnosis</p> <p><i>what does it mean when u have these syphems: blood in stool whit blood ells in urian abdominal pain</i></p>
DIAGNOSE ME	<p>Frame:</p> <p>Question Type trigger: have syphems</p> <p>Theme: blood in stool</p> <p>Theme: blood ells in urian</p> <p>Theme: abdominal pain</p>
	<p>Concerned with the method of diagnosing of a particular problem. These questions can simply ask about the diagnostic process for a given disease or specific types of diagnostic tests.</p> <p><i>Could you please let me know the name of the blood test used to diagnose a vitiligo carrier?</i></p>
DIAGNOSIS	<p>Frame:</p> <p>Question Type trigger: diagnose</p> <p>Theme: vitiligo carrier</p> <p>Agent: blood test</p>
	<p>Concerned with the conditions that the drug or therapeutic procedure is used for.</p> <p><i>I have a pacemakerr why a stress test</i></p>
INDICATION	<p>Frame:</p> <p>Question Type trigger: why</p> <p>Theme: stress test</p> <p>Restrictor: pacemaker</p> <p><i>is thorazine given to hospice patients for pain?</i></p> <p>Frame:</p> <p>Question Type trigger: given</p> <p>Theme: thorazine</p> <p>Patient: hospice ptient</p>

	Purpose: pain .
	Concerned with basic information about a named entity. <i>I have osteopoikilosis and would like more information on this condition.</i> Question Type trigger: information Theme: osteopoikilosis
INFORMATION	<i>What are the different types of syringomyelia?</i> Question Type trigger: types Theme: syringomyelia
	Concerned with ingredients of a drug/supplement. <i>Please tell me if ropinirole is gluten-free.</i> Question Type trigger: gluten-free Theme: ropinirole
INGREDIENT	
	Concerned with interactions between drugs. <i>I would like to know if there are any drug reaction between Carvedilol 25 mg to Hydrslazine50 mg</i> Question Type trigger: reaction Theme: Carvedilol Theme: Hydrslazine
INTERACTION	
	Concerned with the kinds of lifestyle/diet changes <i>how to gain weigh</i> Question Type trigger: gain Theme: weigh (annotate weigh as OrganismFunction)
LIFESTYLE_DIET	
	Concerned with the body location of a problem or device. Can be used for anatomical parts as well (where is the liver?) <i>Does IP affect any areas inside the body, such as internal organs?</i> Question Type trigger: areas inside the body Theme: IP Question Type trigger: internal organs Theme: IP
LOCATION	
	Concerned with finding individuals or organizations. <i>How can I find a physician who is knowledgeable about carbamoyl phosphate synthase 1 deficiency?</i>
PERSON_ ORGANIZATION	

	<p>Question Type trigger: find Theme: carbamoyl phosphate synthase 1 deficiency Agent: physician</p> <p><i>Are there any support groups for adults with blepharophimosis type 1?</i> Question Type trigger: Are there Theme: blepharophimosis type 1 Patient: adults Agent: support groups</p>
PREVENTION	<p>Concerned with prevention of a disease.</p> <p><i>Is there any way to prevent LHON with certain vitamins?</i> Question Type trigger: prevent Theme: LHON Agent: vitamins</p>
PROGNOSIS	<p>Concerned with life expectancy and long-term quality of life.</p> <p><i>As Burkitt is so rare, there is a lack of research determining whether the treatment is curative or palliative and I want to know what the chances are that it will return.</i> Question Type trigger: return Theme: Burkitt</p> <p><i>my daughter has several duplication in cromozome 4 and drs cant figure out where its coming from if possible maybe u can give me some feed back on what to exspect</i> Question Type trigger: exspect Theme: duplication in cromozome 4 Patient: daughter</p> <p><i>who survives lung cancer?</i> Question Type trigger: survives Theme: lung cancer</p>
SUSCEPTIBILITY	<p>Concerned with how a disease spreads, its transmission, as well as whether the disease is genetic and with the inheritance patterns of a disease (formerly INHERITANCE). Questions about prevalence of a disease in a certain population, whether it is rare, etc. are also included (formerly, FREQUENCY).</p> <p><i>How is the herpes virus transmitted?</i> Question Type trigger: transmitted Theme: herpes virus</p> <p><i>Is there any evidence that hemorrhagic shock and encephalopathy syndrome is passed from parent to child?</i> Question Type trigger: passed Theme: hemorrhagic shock</p>

	<p>Question Type trigger: passed Theme: encephalopathy syndrome</p> <p><i>Could you tell me which database I could look at to find the most recent data on neuroblastoma epidemiology; in particular the prevalence in Europe?</i></p> <p>Question Type trigger: prevalence Theme: neuroblastoma Locative: Europe ReserchCue: most recent data</p>
SYMPTOM	<p>Concerned with the signs and symptoms of a disease, including asking what the symptoms of a disease are, whether specific issues are symptoms of the disease, and the typical magnitude of the symptoms.</p> <p><i>Is fatigue a common symptom of polyglucosan body disease?</i></p> <p>Question Type trigger: symptom Theme: polyglucosan body disease Agent: fatigue</p> <p><i>When a person is very dehydrated do they sometimes get a tight pain in their chest</i></p> <p>Question Type trigger: get Theme: dehydrated Agent: tight pain Locative: chest</p>
TREATMENT	<p>Concerned with treatment, cure and management of a disease.</p> <p><i>which steroids are normally used to mature fetus lungs?</i></p> <p>Question Type trigger: mature Theme: fetus lungs Agent: steroids</p> <p><i>Is there a cure for HTLV-1 in general?</i></p> <p>Question Type trigger: cure Theme: HTLV-1</p>
TIME	<p>Concerned with time or duration of an event. If the most logical rewrite of the question starts with When, annotate as Time</p> <p><i>How quick does Lidocaine start working to relieve the pain?</i> <i>When does lidocaine start acting?</i></p> <p>Frame: Question Type trigger: start working Theme: Lidocaine Purpose: relieve pain</p> <p><i>when organ of fetus are ready to function on their own</i></p>

Frame:
Question Type trigger: ready to function
Theme: organ of fetus

hepatitis A blood test. how long does it take for the lab to determine the result

Frame:
Question Type trigger: determine the result
Theme: hepatitis A blood test
Agent: lab

Concerned with patient instructions for using a drug, a medical device, application of a procedure. Includes questions like how, how often (frequency), at what age. Also includes questions about how to stop using a drug/procedure/device, appropriate dosage of a drug and instructions about how to store/dispose a drug or device, whether it can be used beyond expiration date, its stability/potency after storage in unusual conditions.

What is the maximum daily dosage of Metformin?

Frame:
Question Type trigger: maximum daily dosage
Theme: Metformin

USAGE

Can I use Ringers Lactate after it freezes and is thawed?

Frame:
Question Type trigger: use
Theme: Ringers Lactate
Restrictor: thawed

when to take famotidine, before or after meals

Frame:
Question Type trigger: take
Theme: famotidine
Temporal: before or after meals

A question type can somewhat overlap or subsume another one. In these cases, try to pick the more specific one. Among the examples we looked at, we found that CAUSE is more specific than DIAGNOSE_ME, COMPLICATION is more specific than ASSOCIATION (also directional, whereas ASSOCIATION generally isn't). INFORMATION is generic.

We have an additional type **OTHER_QUESTION**, which can be used if the question does not fit in one of the classes above. If this type is used, the annotator should add a note indicating the proposed question type (use all uppercase and underscore for consistency). In brat, Notes text box is at the bottom of the dialog that comes up when an entity is selected.