

## The concept of "Problem"

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These days, the terms "problem" and "problem list" are commonly seen. It seems that problem have finally become "patient's disease". It has taken almost 40 long years since we started using the term problem to exclude social events that are not diseases from the list of problems. This is a welcome development in thinking.

Unfortunately, however, it is difficult to say that the concept of Problem is correctly understood and used in medical practice. Therefore, I would like to explain, once again from the ground up, the concept of Problem which has been practiced, demonstrated and explained by the Comprehensive Problem-Based System for a long time.

1) First, let's look at the usage and meaning of some of the words we use or see every day. Problem in the English dictionary ;

"Problem" Longman: a question for consideration or for which an answer is needed.

Oxford: doubtful or difficult matter requiring solution.

The translations of the word problem in the English-Japanese, German-Japanese dictionary;

"Problem": "Mondai", issue or question.

According to the Japanese dictionary;

the Japanese word "Mondai" Kadokawa Kokugo Chu-Jiten: a matter to be taken up for discussion, study or solution.

Kohjien: a matter that should be studied, discussed and resolved.

Gakken Kokugo Jiten: a matter that must be solved.

They all have a similar meaning. We have this usage and content in our minds as a matter of course. It is no wonder that we are also clinging to this nuance when we speak of "problem" or "problem list".

"Problem" which we use here is a different letter designation, which is neither a problem nor an issue. It is written in "pu-ro-bu-re-mu プロブレム"(katakana:one of the written letters of Japan) in order to break the existing meaning and present a new concept. I would like you to dispel any images of problem or issue that you may have in your mind before you start to understand the concept of problem.

2) Let's move from general terms to medical terms. Two typical terms with similar meanings are "disease and illness" and "*shikkan* and *byouki*". How do we use the them?

Illness *byouki*: He is ill. He has a *byouki*.

Disease *shikkan*: Lung cancer is a disease. Lung cancer is a *shikkan*.

We say he is *byouki*, but we unlikely say he is *shikkan*. Lung cancer is a *shikkan*, and lung

cancer is also said as a *byouki*. Vertigo is a *byouki*, but it is unlikely said that vertigo is a *shikkan*. Diaphragmatic hiatal hernia is a *shikkan*, but we would probably not call it a *byouki*. In this way, the two terms seem to have different connotations. We use them interchangeably.

Since this is the case, I would like to make the difference between the two as clear as possible at this point. If there is any ambiguity, I want to dispel it.

3) We say that he has a *byouki* and ask if his *byouki* is severe. But, we don't say that his has a *shikkan* and don't ask if his *shikkan* is severe. On the other hand, we say lung cancer is a *shikkan* or a *byouki*, both used.

*Shikkan* is named as common, whereas *byouki* has an owner, as in his/ her *byouki*. His lung cancer is not her lung cancer. Each one is different from the other.

After this the two terms are used as such.

<i>shikkan</i>	his <i>byouki</i>	her <i>byouki</i>	my <i>byouki</i>
pneumonia	his pneumonia	her pneumonia	my pneumonia
myocardial infarct	his myocardial infarct	her myocardial infarct	my myocardial infarct

4 .

4) Romeo and Juliet : specific and separate.

There is no doubt about this. By the way, Romeo is a human being and Juliet is a human being. What does this mean? The two are different, but they are one and the same thing: human being.

His illness/Her illness: unique and separate

His illness is lung cancer and her illness is lung cancer. His and her illnesses are different from each other, but they are said to be the same in terms of lung cancer.

In this case, "human being" "lung cancer" is a concept.

A concept is an idea that expresses the essence of things by abstracting common features, discarding the nature of individual specifics.

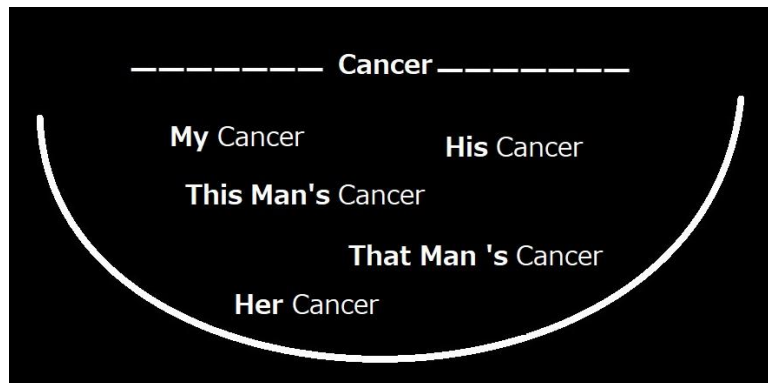
Romeo and Juliet are individual, but both have the common characteristic of human being. His illness and her illness are individual, but both have the common feature of lung cancer.

5) Let me show you this diagram. There is a big bag with a name tag on it. "Human". Inside the bag are Shakespeare, Carolyn, Tendzin, YangGuife, Turing, Marina, Zatopek, ■ ■ ■, and all are humans in the bag.



6) His illness/Her illness : specific and separate. Both are lung cancer.

His illness (lung cancer) and her illness (lung cancer) are both contained within the nameplate “lung cancer”.



7) Concept Universal: human / lung cancer

Individual Special: Romeo/Juliet

Romeo's lung cancer / Juliet's lung cancer

Universal Concept	Individual Special	Individual Special
Human	Romeo	Juliet
Lung cancer	Romeo's lung cancer	Juliet's lung cancer

In summary, Romeo's lung cancer is individual and special, while human being and lung cancer are universal concepts. Within the universal concept is an individual and specific one.

It is difficult to see if there is a medical term to distinguish between the two. Because of this lack of clear recognition, there is no clear terminology that defines them. As we have seen above, we use the two terms, illness and disease, somewhat vaguely to mean that “Byouki” is something specific to each individual and that “Shikkan” is a universal concept. Let's use the two terms in this definition. Incidentally, if there is a word in English that distinguishes between the two, there is nothing clear-cut either. There is a hint that Byouki is equivalent to Illness and Shikkan to Disease.

8) Individually unique objects are contained within a large bag, and mathematics uses the set symbol to denote this state of affairs.

Human ⊃	Shakespeare	Lung cancer ⊃	Shakespeare's own	lung cancer
	Marina		Marina's own	lung cancer
	Tendzin		Tendzin's own	lung cancer
	Romeo		Romeo's own	lung cancer
	Turing		Turing's own	lung cancer

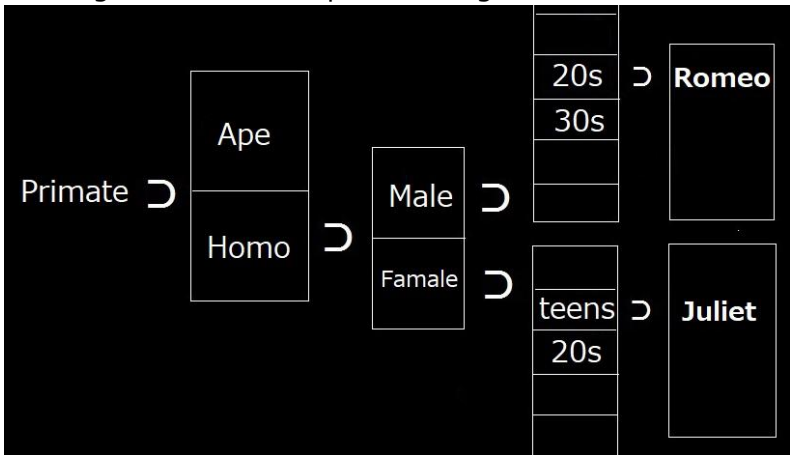
	MurasakiShikibu		MurasakiShikibu's own lung cancer
	Juliet		Juliet's own lung cancer
	Carolyn		Carolyn's own lung cancer
	Zatopek		Zatopek's own lung cancer
	Lucyna		Lucyna's own lung cancer

There are about seven billion things in the human pouch, together with Juliet. The seven billion are so vague that we don't even know where Juliet is in the pouch. Can't we organize the seven billion a little more and group them into groups of common characteristics to make her easier to find?

9) If we suddenly throw Juliet into the human species as they are, she will be buried in the seven billion. Therefore, let's place Juliet in a more detailed category of human beings. First, humans are divided into two halves, male and female. Then Juliet is in the female half of the human population. Let's further divide female by age. Then, Juliet will be in the female teens. In this way, the circle narrows one after another and Juliet can be positioned.

10) We would like to expand our thinking further here. I would like you to think about this while looking at the diagram in the previous section.

Both Romeo and Juliet belong to the concept of human beings. The concept of human beings is a much bigger and broader concept, and there is no distinction between age or sex. So, there are seven billion people. Juliet is in the concept of female among humans, and she is with other teenagers in the concept of teenager.



In this way, a concept can be said to be a set. Human is an super set with male and female as subsets, and male and female are subset of human. It is immediately apparent that subsets are mutually exclusive. There is never female among male; there is never a teenager and a twentysomething. The boundaries between subsets fit together without gaps, but they never overlap.

So, is man the supreme concept? There is no way that human is a supreme set. Human is a superset of their subsets, but there are a superset of human as well. There, human is a subset of the superset. The subset exclusive of human would be ape, and their superset would be primate.

11) The review so far has revealed some important things.

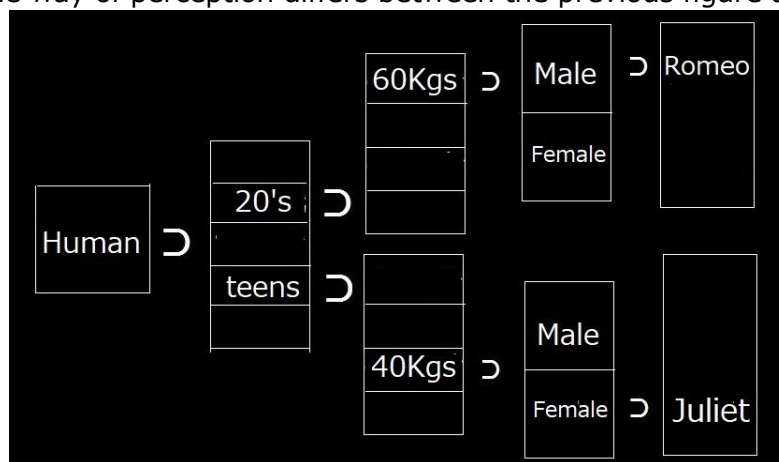
Concepts are sets.

Subsets are exclusive.

Supersets are broad general.

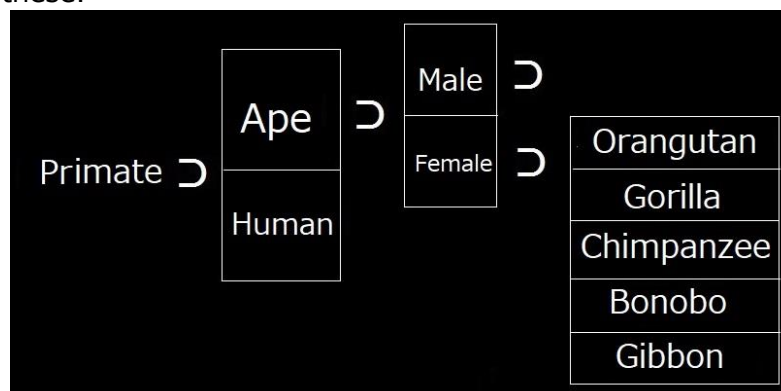
Subsets are limited special.

12) By the way, have a look at this diagram. In the previous figure (10), human was first divided into sexes. In other ways of dividing human, such as in this diagram, human is first divided by age, then by weight, and then by sex. Looking at both diagrams, it can be said that these are the perception images by humans and a way of perceiving how people see humans. The way of perception differs between the previous figure and this one.



Which is more rational and orderly, the previous diagram or this one? You don't have to reason, just compare them and feel which one is better. The moment you open the door and someone walks in, do you 'subconsciously' recognize first whether they are fat or thin, a man or a woman? Most people would feel that the previous figure (10) is better.

13) Let's look at the perceptions of ape below. An ape comes towards you. For a moment, what do you recognize about the ape? It's sex? Then, you try to figure out if it is a gorilla or a gibbon? The moment you notice an animal, you pay attention to whether it is a male or female, and then you finally wonder whether it is a dog or a cat. No way. There is cognitive confusion in these.



Note the order of the concept of human from superset to subset. In Figure (12), the general broad set is a subset of the limited special set. The limited special set is the superset of the general broad set. Instead of gradually subdividing the whole into smaller parts, it is suddenly subdivided into smaller parts. The first subdivisions are age and weight, with sex, which is a general category, being an afterthought. This makes people feel uncomfortable and makes this perception messy and confusing.

14) The same is true for medical events, where the reversal of super—subsets is bizarre.

○ Acute pneumonia  $\supset$  Acute pneumococcal pneumonia      correct

X Acute pneumococcal pneumonia  $\supset$  Acute pneumonia      not correct.

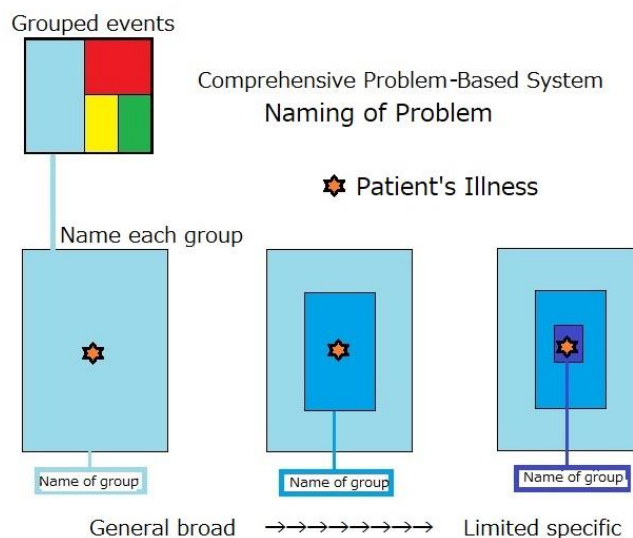
○ Polyarthritis  $\supset$  Rheumatoid arthritis      correct

X Rheumatoid arthritis  $\supset$  polyarthritis      not correct

You have to think about it all the time. When you encounter a term (concept), what is its super-concept or superset? What is its sub-concept or subset?

15) Examine medical practice issues in the light of the idea of generalized concept or set of concept. What is his disease? What is the name of the disease? What is the diagnosis at this point in time? This is always our task.

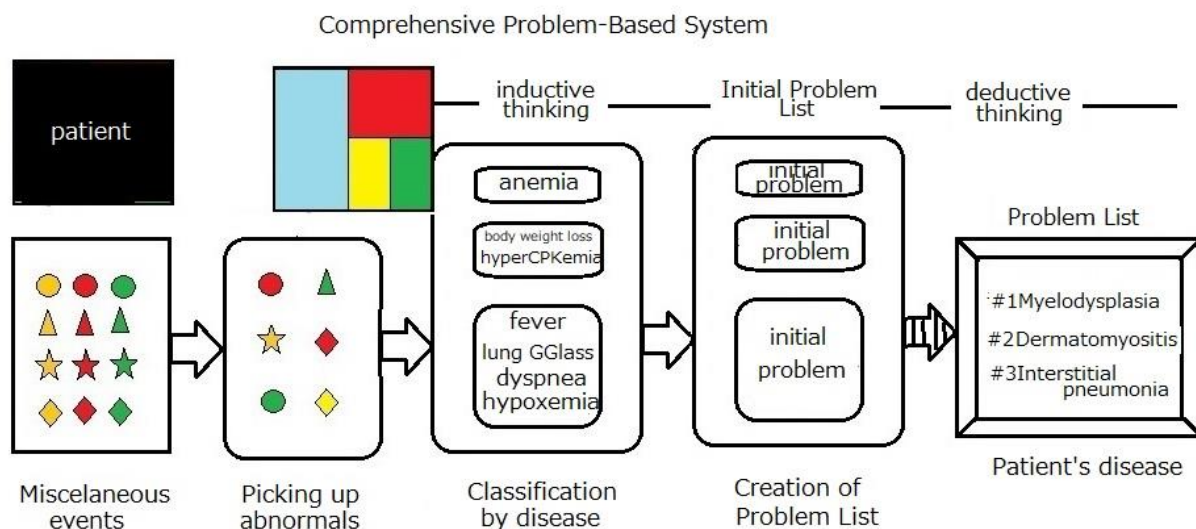
The patient's illness is in the set called by its name. Conversely, the moment we call the patient's illness by name, we have placed the illness in the set of it's name of disease. At the beginning, it is normal that the illness can only be placed in a broad set. As the diagnostic work progresses, the set including the illness narrows towards the limited and specific. The disease becomes more specific. The diagnostic work proceeds in search of a limited specific name. The name of the set obtained at each point in time is the diagnosis at that point in time, i.e. the name of the disease, and it is called the "problem".



16) Let us now take a bird's-eye view of the whole picture of the Comprehensive Problem - Based System.

The information materials obtained (symptoms findings) are divided into groups of diseases. Each group is then given a name and called by its own name. This is the name of the first diagnosis and is called the “initial problem”. Each individual problem corresponds to an individual disease. The problem is a disease concept that is one level higher than the individual symptoms findings. The first part of this will be touched on later.

Once the initial problems have been defined, the second half of the diagnostic work can begin for a more limited special set.



17) It may be difficult to understand the problem in abstract terms alone, so let's do some concrete diagnostic work in the second half as a way of helping to understand what problems are. Start working with this diagram. I want you to think for yourself.

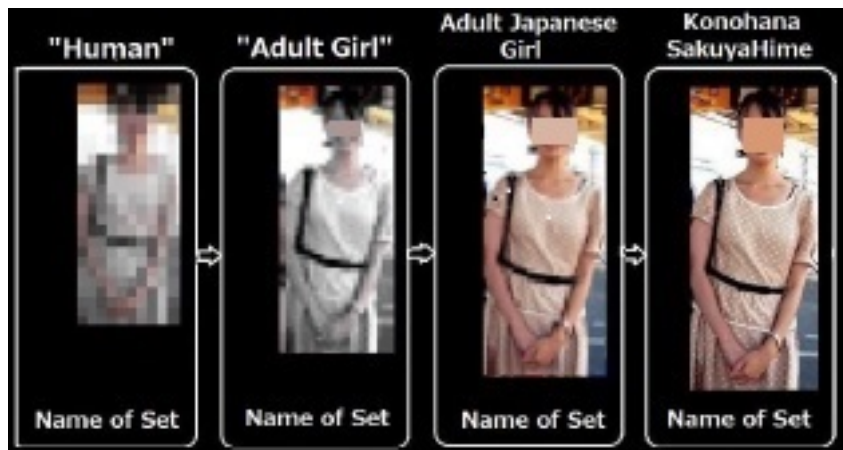
Something is coming towards you in a complex movement. What is this? Let's give it a name now and call it.

“Living thing”, you say. The set “creature” also includes plants. Plants don't come in motion. Can't you narrow down the name more?

18) Let's say “animal”. This thing is in the set “animal”. More information as it gets closer. This thing is in one of the subsets of the set “animal”. Name that subset, “Human”.

19) More information obtained. What? “Woman”. So, she could be an 80-year-old grandmother or a zero-year-old baby? I think you can diagnose up to “Adult girl”. The problem at this point is “Adult girl”.

20) As it gets closer and closer, more and more information can be added, making the set to which this thing belongs a more limited and specific name. “Adult Japanese girl”.



21) At last we come to a point where no more information is available. This then becomes the final diagnosis. What is this set name, what is the diagnosis?

"KonohanaSakuya Hime" (TreeFlowerBlossam Princess ; Mythical princess). This is the problem at this point. The series of events, that began with the animals and culminated in KonohanaSakuya Hime, is the second half of the diagnostic process. As information increases, knowledge of this object increases and it becomes possible to call it by a limited and specific name.

Step by step, the set is narrowed down to conclude what it is, but the conclusion must have a basis. If there is no basis for assuming it to be true, the diagnosis cannot move forward. It must not be a problem based on speculation. Do not call "KonohanaSakuyaHime" as "OnonoKomachi"(Actual beautiful female poet in the Heian period) on a haphazard basis.

22) Sometimes there is not enough information to move forward. For example, it is only possible to diagnose up to "Adult girl". In that case, you need to know what you need to know to get to the next subset.

Then, a test plan to find out is developed and implemented. If the diagnostic process proceeds in this way, the test is clear about what it affirms and denies. It will not just be a random guess test.

23) An important note should be made here. The problem "KonohanaSakuya Hime" is the name of a set. There are several KonohanaSakuya Hime in this set. This one is one of them. Each KonohanaSakuya Hime is unique and different, but they are all KonohanaSakuya Hime. I would like to remind you that his lung cancer and her lung cancer are unique and different, but they have the same name of lung cancer.

24) A problem is a patient's illness, not a problem in the 'ordinary sense' of the word or an issue. A problem list is a list of patient illnesses.

In the case of KonohanaSakuya Hime, the problem list would go like this. (Numbering and date rules are separate)

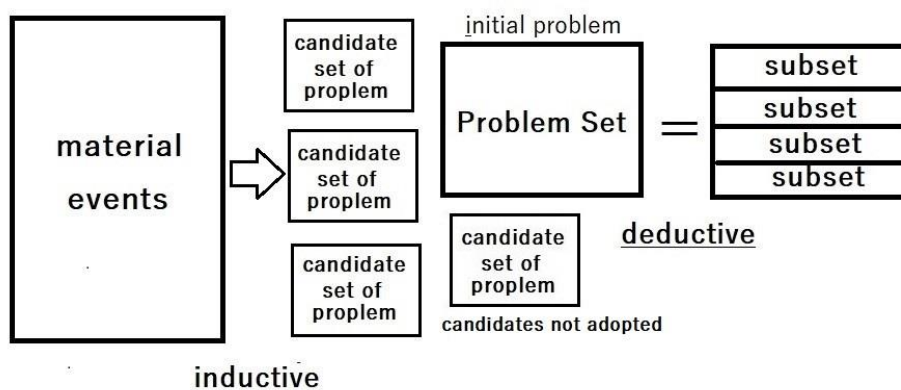
#1 Human [date] → KonohanaSakuya Hime [date] (Animal is omitted).

Diagnostic process: #1 Human → Adult girl→ Adult Japanese girl→ KomohanaSakuya Hime

Step by step, the set names become more and more limited and specific. At each point in time, it is the conclusion of 'what is this', i.e. the diagnostic name of the disease at that point in time.

25) The first half of the process is from the acquisition of the information materials to the determination of the problem, that is the recognition of the initial problem. The initial problem is determined from the basic data information, but the diagnostic process of seeking a limited special name as described above is the second half of the process after the initial problem is determined as the starting set.

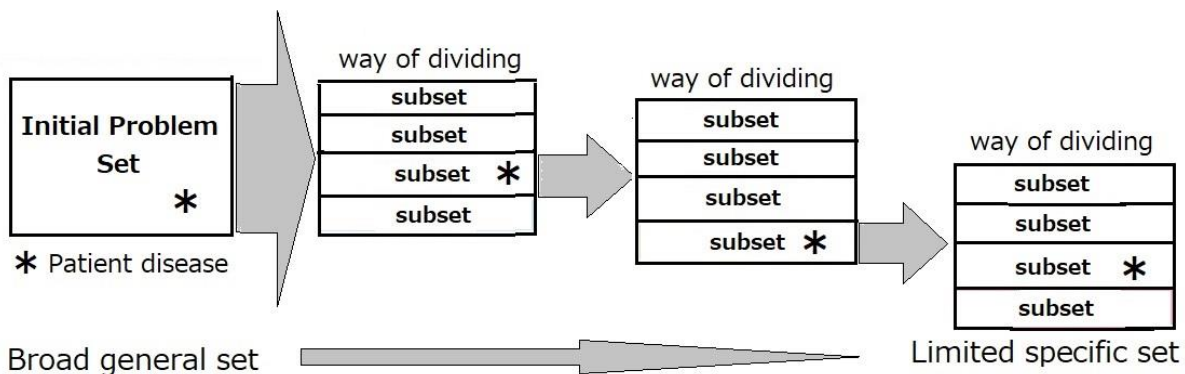
The first half of the process up to the initial problem is “inductive”, while the second half of the process of limited special diagnosis from there is “deductive”.



26) “Inductive” thinking requires insight. It is the ability to grasp the essence, similar to intuition, which is difficult to express in words, backed up by experience as well as broad and deep knowledge, because it finds truly meaningful issues in a chaotic reality.

From there, the subset work begins, with the initial problem as the superset.

27) “Deductive” thinking is based on the fact that the disease is always in its subset. It is somewhere in there. It is identified by tracing the lower subsets one after another.

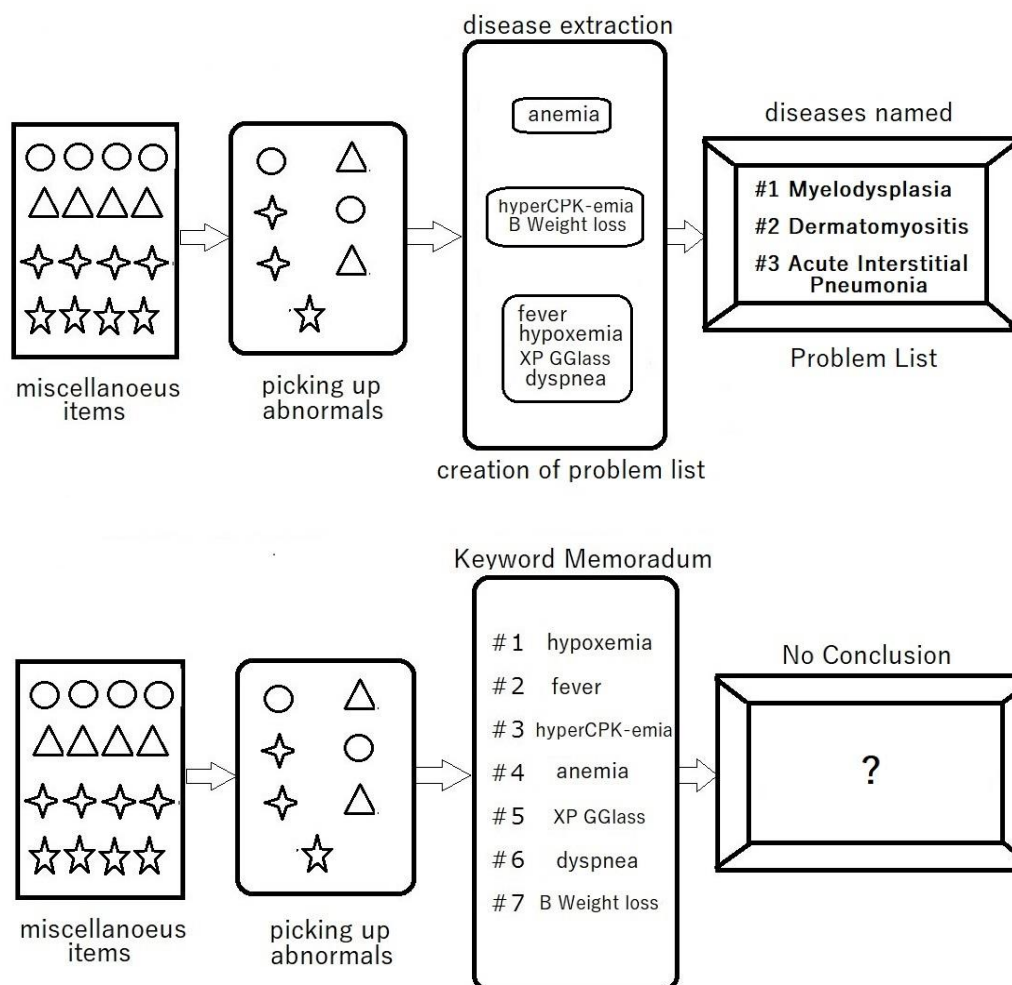


28) Let's look at the commonplace problem lists found all around. Although it is called a problem list, it is merely a list of key words. There is no conclusion as to what the disease is.

Please compare the two below. The one below is just a list of abnormalities, from which there is no pathway to analysis, consideration, judging and conclusion. This makes no sense for actual medical practice.

The one above is Comprehensive Problem-Based System already shown (16). The crucial thing is the conclusion for 'What is the disease?', and that is what we are looking for.

As you can see from the diagram, the disease is recognized from the collected material information. This is a set of disease concept that is one level higher than the symptoms findings. It is the initial problem, the diagnosis at this point and the first disease name we have arrived at.



29) Let me show you real examples. These were presented as a problem list at a CPC discussion at a certain society of internal medicine. There were three discussants taking part in the debate, [A][B] being from each specialty department and [C] from Comprehensive Problem-Based Internal Medicine.

#### [A] Problem List

- # 1 Hypoxemia(ground glass opacity)
- # 2 Alveolar hemorrhage
- # 3 Bilateral pleural effusion
- # 4 Fever
- # 5 Cardiac murmur
- # 6 Leucosytosis(Lymphocyte decrease)
- # 7 Anemia
- # 8 Platelet decrease
- # 9 Hypocomplementemia
- # 10 Proteinuria
- # 11 Abnormal coagulation
- # 12 Liver dysfunction

#### [B] Problem List

- Positive findings
- # 1 Hx of asymptomatic congenital cardiac valvular disease
  - # 2 Fatigue Cough
  - # 3 Shoulder neck fatigue
  - # 4 Fever
  - # 5 Hemoptysis
  - # 6 Coarse crackle in btl.lower lung fields
  - # 7 Cardiac murmur ; at 2RSB:pandistolic murmur,III/VI. at apex;pansystolic murmur,III/VI
  - # 8 WBC13900/μl(band 12%, seg 75%), CRP 5.31mg/dl
  - # 9 Hb7.3g/dl, MCV83.5fl
  - # 10 Plt1.1万/μl
  - # 11 LDH277 IU/L, AST47 IU/L, ALT12 IU/L
  - # 12 TP5.6g/dl,Alb2.4g/dl
- (omitted below)

#### [C] Problem List

- # 1 **Combined cardiac valvular disease**(MR+AS)
- # 2 **Fever →Subacute infective endocarditis**
- # 3 **Thrombocytopenia→**  
**Vegetation-consumptive thrombocytopenia(#2)**
- # 4 **Alveolar hemorrhage →**  
**Alveolar capillaritis(#2)**

It is obvious that [A][B] is a keyword memorandum list. There is no logical process or conclusion to the diagnosis, only that this and that cannot be ruled out. Top right is the problem list of the Comprehensive Problem-Based System. It is a list of diagnostic conclusions that have gone through the diagnostic process. Putting the diagnosis aside for the moment, you should be able to see what is different and how the dimensions are different.

30) Finally, let us summarize what we have learned from our review so far.

The concept of problems:

- 1 Problem is a disease.
- 2 Problem is a disease that is called that way and only that way at that point in time.
- 3 Problem is the name of the diagnosis and the name of the disease at that point in time.
- 4 Problem is the name of a set, and the individual diseases called by that name are within that set.
- 5 The diagnostic work on the problem proceeds towards calling the disease by a more limited and specific name.
- 6 The problem list is a list of the patient's current illnesses.