

Categorization of Concerns

A Categorical Program Comprehension Model

Tim Frey, Marius Gelhausen and Gunter Saake

Otto-von-Guericke University, Magdeburg, Germany

Content

- Background
- Comprehension model
- Process
- Conclusion
- Questions / Discussion

Separation of Concerns

```
@RolesAllowed(„Admin“)
@Controller
@RequestMapping(„/owners/{ownerId}/edit“)
public class EditOwnerForm {

    private final Clinic clinic;

    @Autowired
    public EditOwnerForm(Clinic clinic) {
        this.clinic = clinic;
    }

    ..}
}
```



Categorization

- Cognition & Comprehension
- Prior knowledge & Prediction
- Material and immaterial categories
- Recognition through features

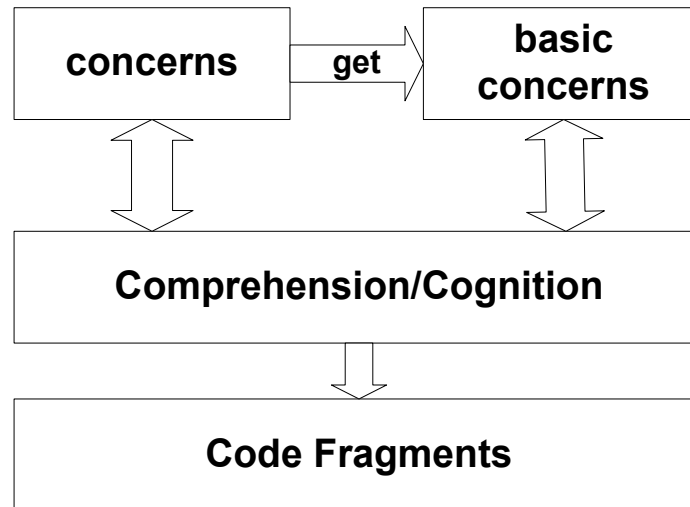


Learning of Concerns

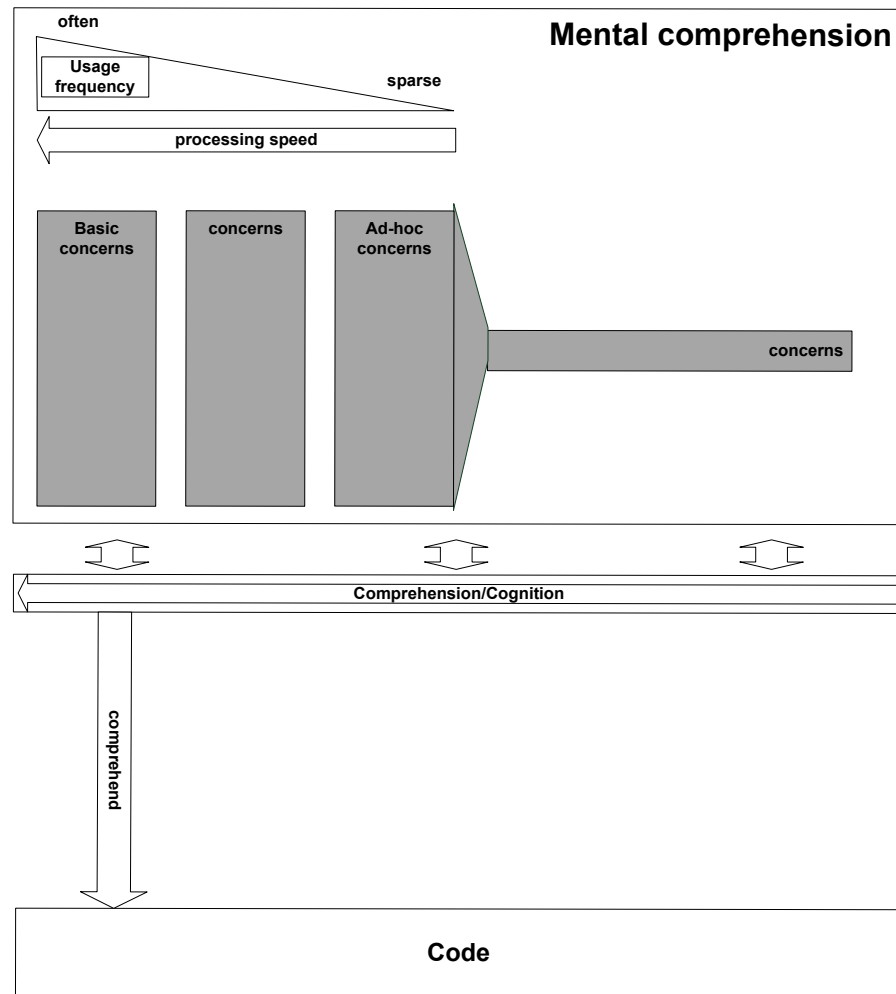
- Usage frequency
- Importance

```
@Entity  
class Car{  
...}
```

```
class CarDAO extends HibernateTemplate{  
...}
```

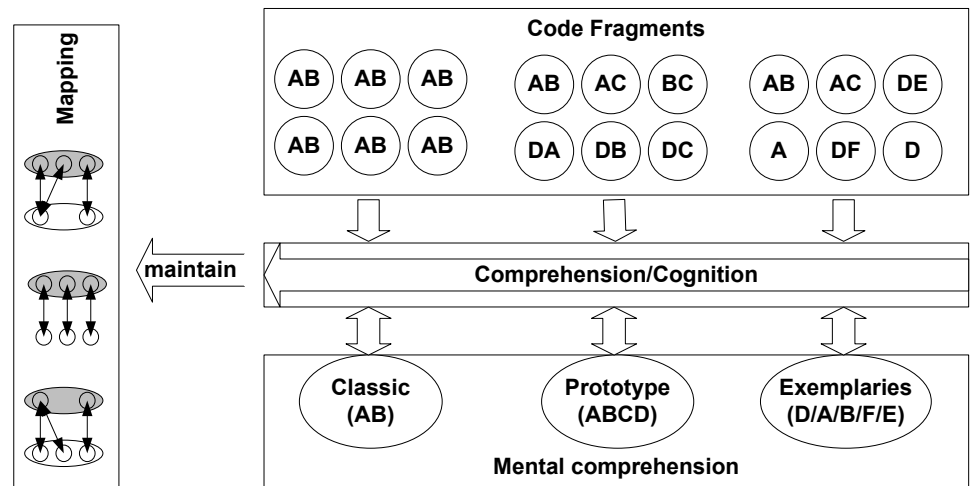


Learning of concerns

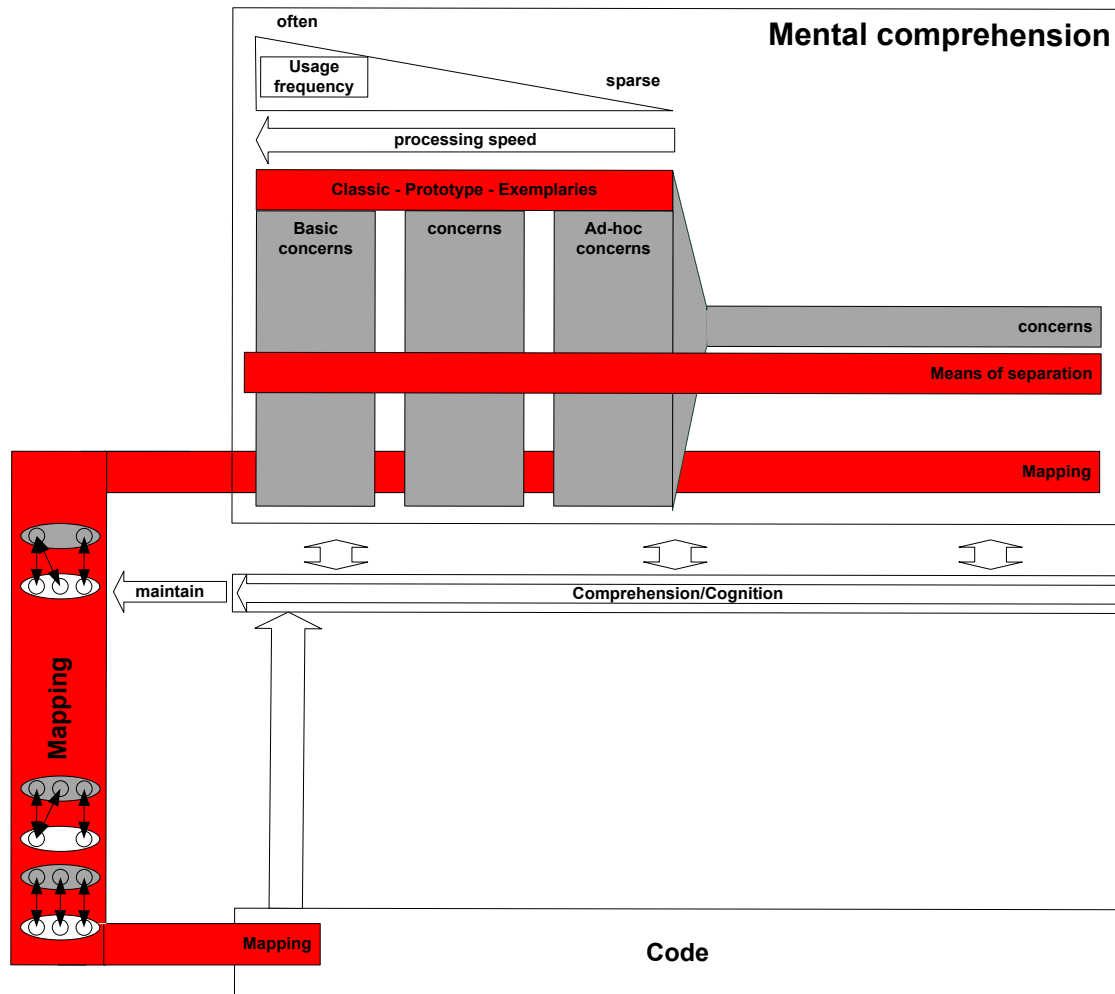


Categorization theories

- Classic
 - Required features
- Prototype
 - Abstract prototype
- Exemplary
 - No “real” categories



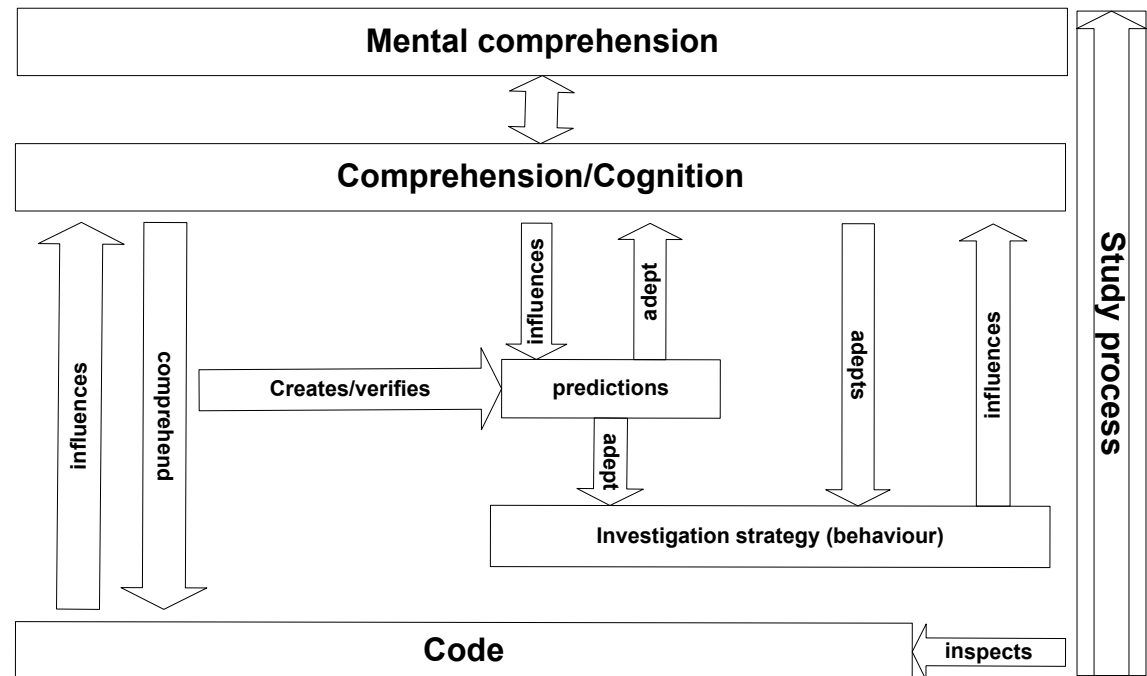
Categorization theories



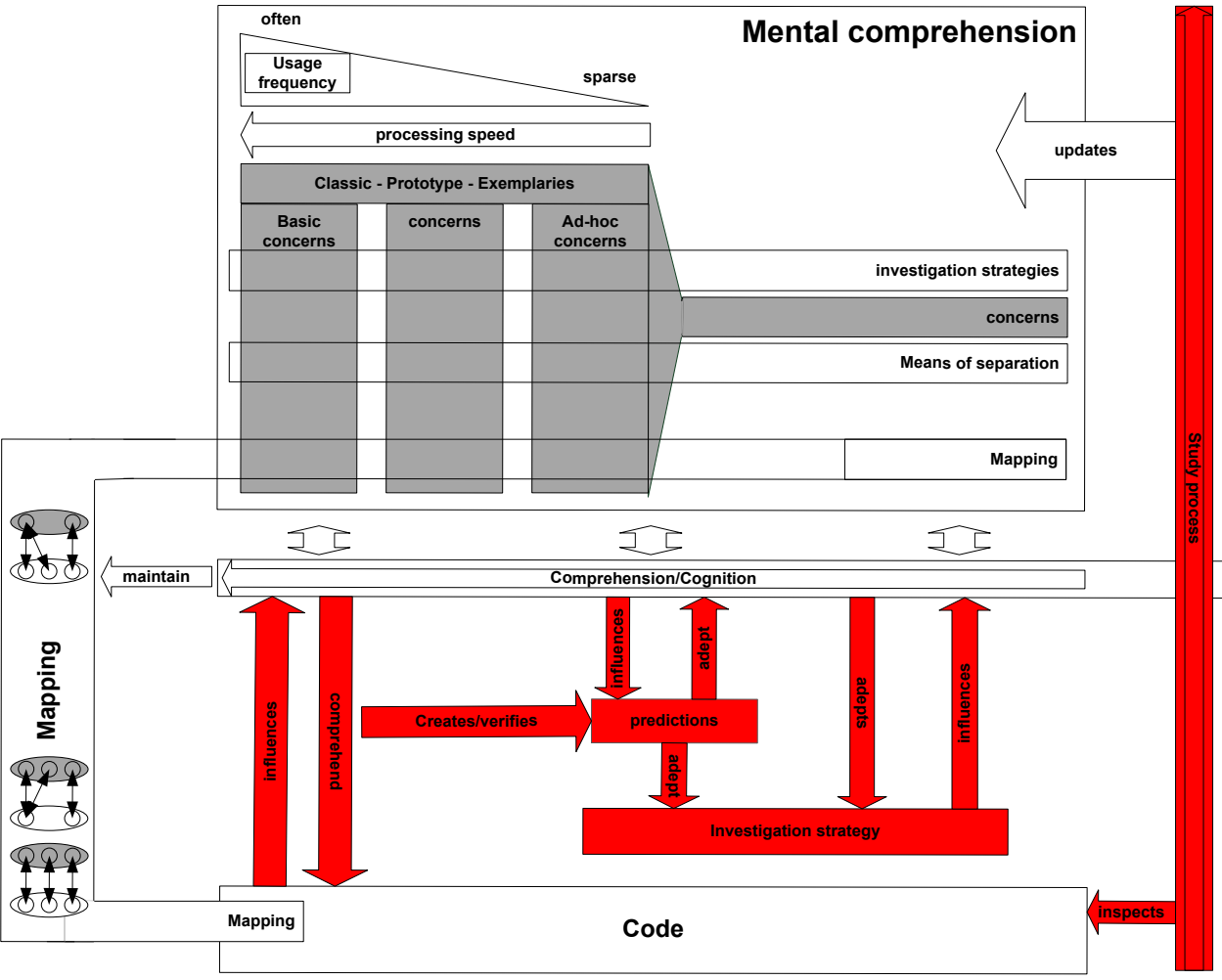
Prediction

```
@Entity  
class Car{  
...}
```

```
class CarDAO extends HibernateTemplate{  
...}
```



Prediction



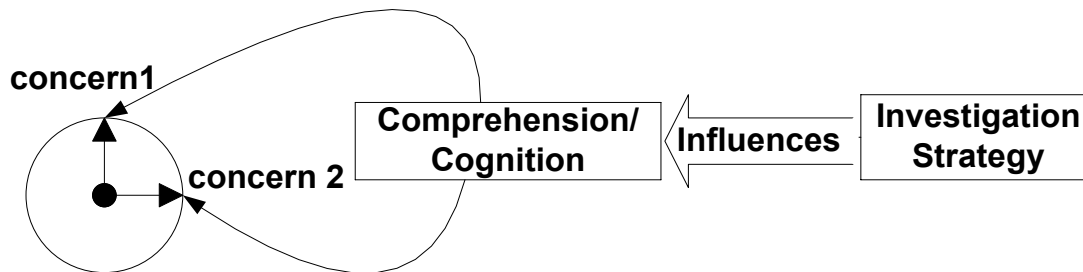
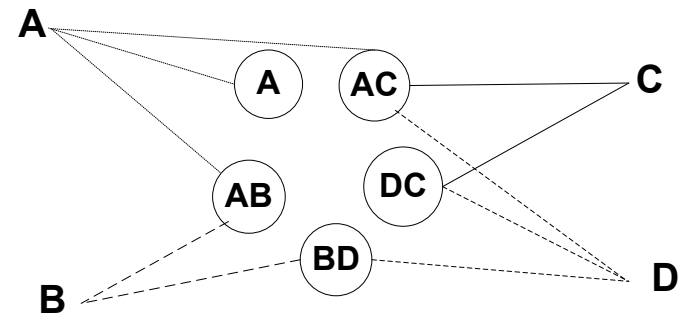
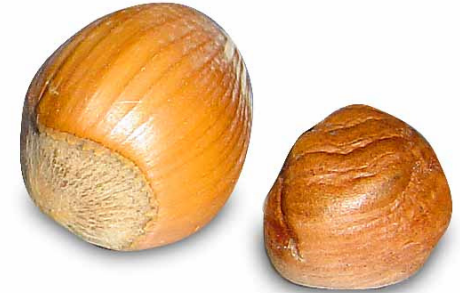
Cross Categorization

```
@RolesAllowed(„Admin“)
```

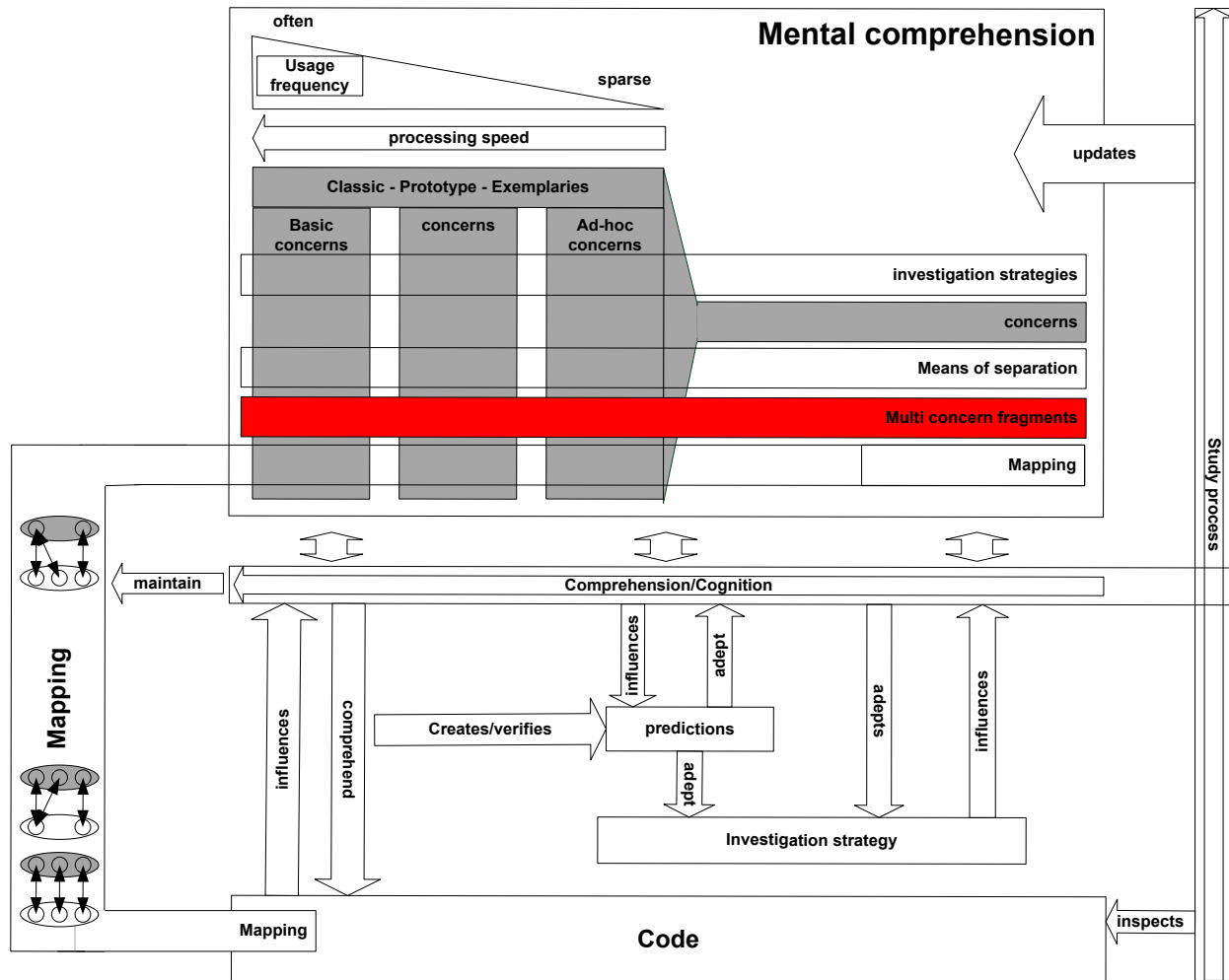
```
@Controller
```

```
@RequestMapping(“/owners/{ownerId}/edit“)
```

```
public class EditOwnerForm {...}
```

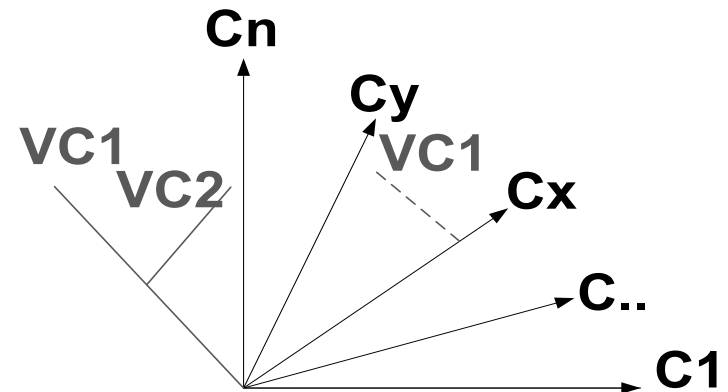
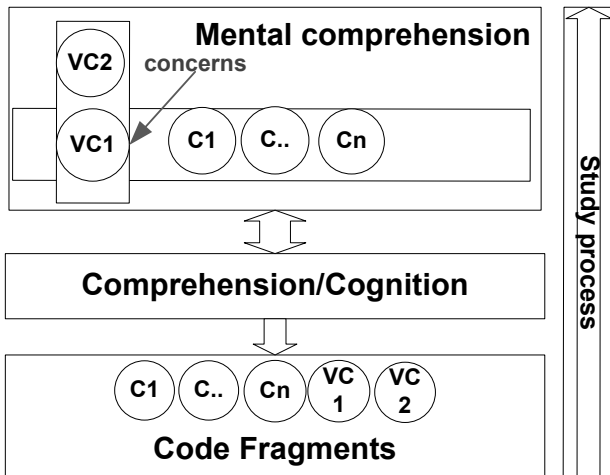


Cross Categorization

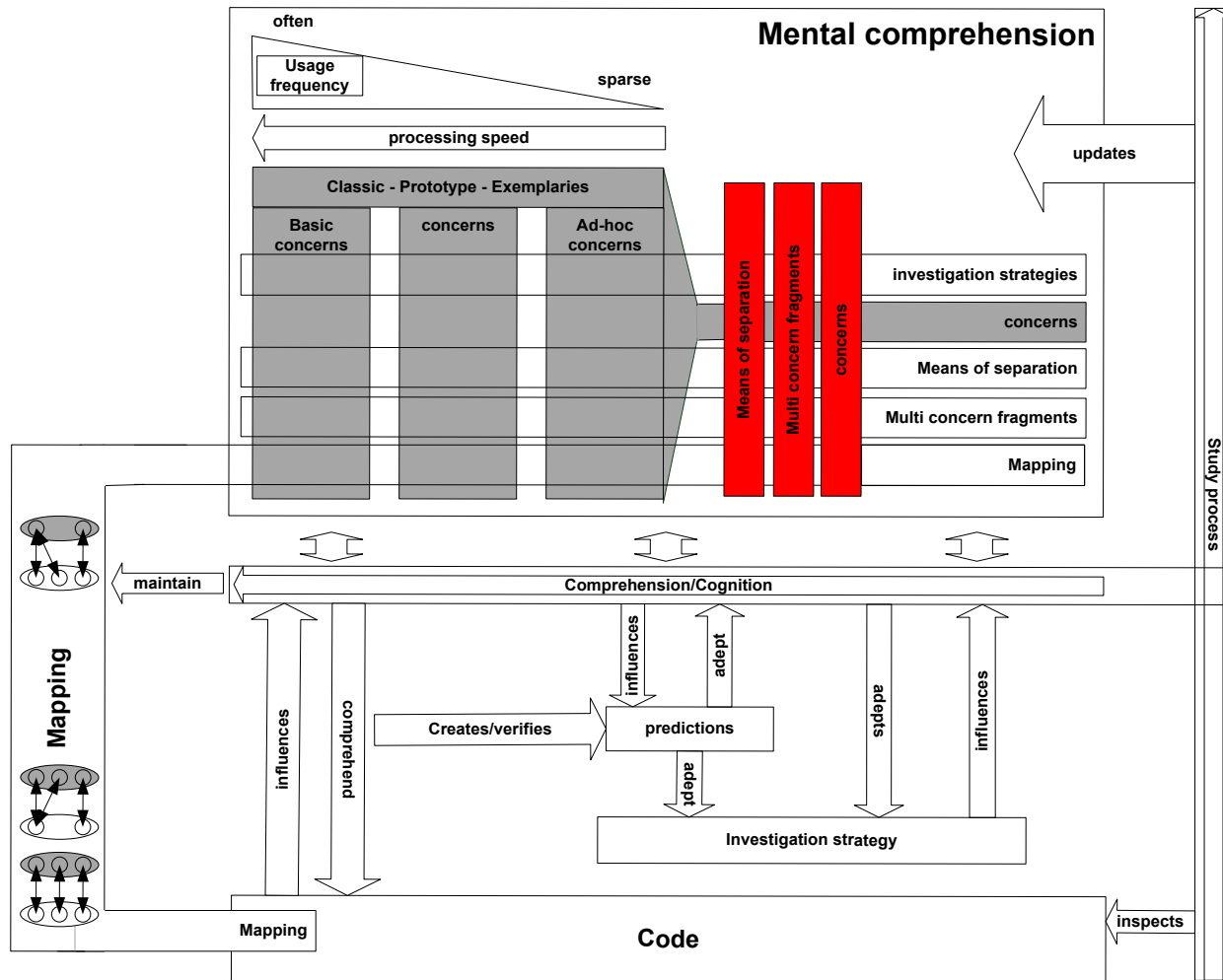


Composition

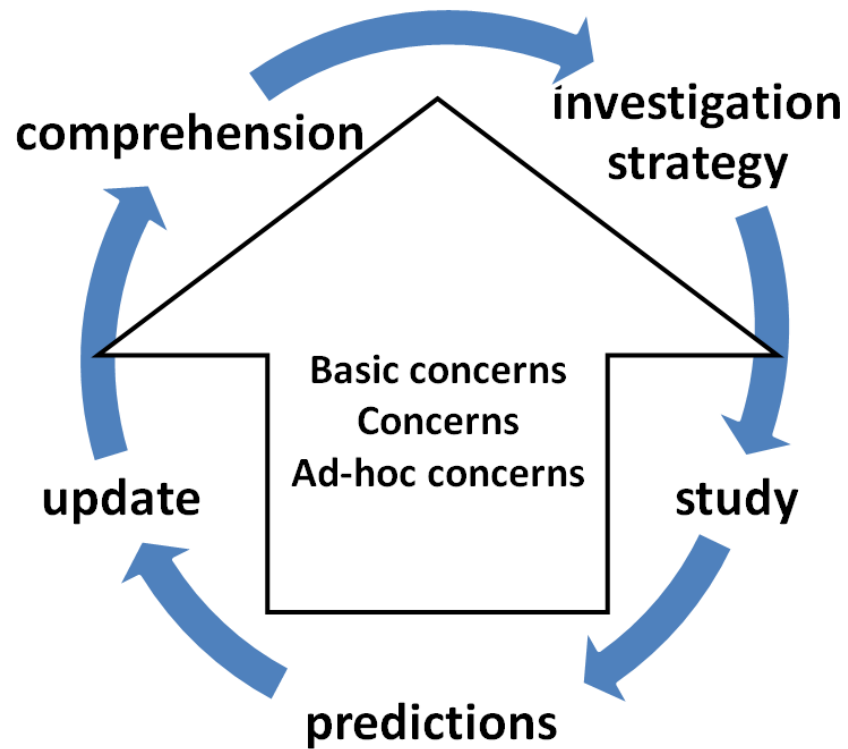
- Concerns can be recognized as concerns itself



Composition



Comprehension Process



Conclusions

- Categorization is relevant for program comprehension
 - The model is a starting point and identifies diverse relevant areas
- Some concerns are more important than others
 - We are quite confident that basic concerns exist
 - How can they be determined? Code rank? Developer tracking?
- Categorization theory as classification for programming languages
 - Can the experiments be transferred?
- Category manifestations in code need to be investigated
- Can the context in what developers study code be determined?
- More investigations and interdisciplinary discussions are needed

Questions / Discussion

