1. **Background: Maxwell's master argument**

M1. If there is no clear distinction between observable and unobservable entities, then empiricism is either false or arbitrary.

M2. There is no clear distinction between observable and unobservable entities.

M3. ∴ Empiricism is either false or arbitrary. (From M1, M2)

2. **Considerations for M1: Kinds of empiricism**

*Fictionalism:* Beliefs about *unobservable* entities are merely useful fictions, i.e. psychological crutches that help guide scientists in devising experiments, but they need not be true or even meaningful in order to fulfill this function.

*Instrumentalism:* Commitments to *unobservable* entities are tools for organizing, predicting, and controlling *observable* entities; they’re not beliefs.

*Phenomenalism:* Sentences about *unobservable* entities are reducible to sentences about *observable* entities.

*Eliminativism:* Unobservable entities should be removed from our vocabulary, primarily because there would be no loss in doing so.

3. **Why is the observable-unobservable distinction unclear? (Arguments for M2)**

3.1. **Big Picture**

P1. If there is a clear observable-unobservable distinction, then observables are either sense data, only those things that can be perceived by humans without technological assistance, or observation is independent of theory.

P2. Observables are not sense data.

P3. Observables are not only those things that can be perceived by humans without technological assistance.

P4. Observation depends on theory.

M2. ∴ There is no clear distinction between observable and unobservable entities.

3.2. **Bad Empiricism Objection (Argument for P2)**

1. If observables are sense data, then ordinary physical objects (tables, chairs) are unobservable.
   a. Sense-data: what one is experiencing

2. But ordinary physical objects are observable.

P2. ∴ Observables are not sense data.

3.3. **Cart-Horse Objection (Argument for P2)**

1. If observables are sense data, then the reasons to believe in ordinary objects depend on the reasons to believe in sense data.

2. The reasons to believe in ordinary objects do not depend on the reasons to believe in sense data (quite the opposite).

P2. ∴ Observables are not sense data.

3.4. **Mediation Objection (Argument for P3)**

1. If observables are only those things that can be perceived by humans without technological assistance, then there are physical objects that cannot be observed through a microscope, telescope, etc. (only color patches, shadows, etc.)

2. Physical objects can be observed through a microscope, telescope, glasses, windows, etc.

P3. ∴ Observables are not only those things that can be perceived by humans without technological assistance.

3.5. **Mutation Objection (Argument for P3)**

1. Many entities are observable to non-humans without technological assistance.

P3. ∴ Observables are not only those things that can be perceived by humans without technological assistance.
3.6. Theory-Dependence Argument (Argument for P4)

1. Something is unobservable iff the theory positing it, plus a theory of perception, entails that it is unobservable.

P4. ∴ Observation depends on theory.

2. Theories only entail meaningful statements.

3. If fictionalism or instrumentalism is true, then theoretical statements are meaningless, and observation statements are meaningful.

4. Neither fictionalism nor instrumentalism are true.

3.7. An independent argument from chemistry...

1. There is a continuous transition from small “unobservable” molecules such as hydrogen, to “medium-sized” ones (proteins), to large, directly observable ones (salt crystals).

2. ∴ Molecules are neither clearly observable nor clearly unobservable entities.

M2. ∴ There is no clear distinction between observable and unobservable entities.