A display-style sequent calculus for Public Announcement Logic

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In recent years, the family of dynamic logics has been the object of intensive investigation and has significantly grown, so as to cover a wide variety of fields of application: from program correctness, to interaction and information dynamics among agents.

Dynamic logics are generally nicely behaved from a computational point of view; however, in some cases, such as the Dynamic Epistemic Logics, they lack properties such as the closure under uniform substitution. This makes their algebraic and proof-theoretic behaviour not so straightforward. Several proof-systems have been proposed in the literature, which are not entirely satisfactory, either because they are too restricted and not easily generalizable, or because they are unintuitive, or because they are not sound with respect to the standard relational semantics.

We present a display-style, cut-free sequent calculus for both the intuitionistic and the classical versions of the logic of public announcements (PAL). Besides being very transparent, this calculus is sound and complete with respect to both the algebraic and the relational semantics of PAL, and enjoys a weaker form of display property, which is still enough to prove the cut-admissibility. This calculus is also modular, so just by modifying the structural rules it is generalizable both to different Dynamic Logics (Epistemic, Deontic, etc.) and to different propositional bases (Linear, Relevant, etc.).

We will focus in particular on the weak display property and discuss the generalizations to other dynamic logics.